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## **The Federal Register**

### **The Daily Journal of the United States Government**

Proposed Rule

## **National Tunnel Inspection Standards**

A Proposed Rule by the [Federal Highway Administration](#) on [07/30/2013](#)

## **Action**

Supplemental Notice Of Proposed Rulemaking (Snprm).

## **Summary**

The FHWA is proposing the National Tunnel Inspection Standards (NTIS) for highway tunnels. The FHWA previously proposed the NTIS in a notice of proposed rulemaking (NPRM) published in the Federal Register on July 22, 2010. On July 6, 2012, the President signed the Moving Ahead for Progress in the 21st Century Act (MAP-21), which requires the Secretary to establish national standards for tunnel inspections. The MAP-21 requires that NTIS contain a number of provisions that were not included in the proposal set forth in the earlier NPRM. As a result, FHWA is issuing this SNPRM to request comment on a revised NTIS proposal that incorporates the provisions required by MAP-21. This SNPRM proposes requirements for tunnel owners, including the establishment of a program for the inspection of highway tunnels, maintenance of a tunnel inventory, reporting of the inspection findings to FHWA, and correction of any critical findings identified during these inspections.

# Unified Agenda

## National Tunnel Inspection Standards (MAP-21)

7 actions from November 18th, 2008 to March 2015

## Table of Contents

- DATES:
- ADDRESSES:
- FOR FURTHER INFORMATION CONTACT:
- SUPPLEMENTARY INFORMATION:
- Electronic Access and Filing
- Executive Summary
- I. Purpose of the Regulatory Action
- II. Summary of the Major Provisions of the Regulatory Action in Question
- III. Costs and Benefits
- Background
- I. Changes to the Proposed Rule Required by MAP-21
- II. Need for Tunnel Inspection Standards

- III. Research Related to Tunnel Inspections
- IV. Proposed NTIS
- Regulatory History
- Section-by-Section Analysis
- 650.501 Purpose
- 650.503 Applicability
- 650.505 Definitions
- 650.507 Tunnel Inspection Organization
- 650.509 Qualifications of Personnel
- 650.511 Inspection Interval
- 650.513 Inspection Procedures
- 650.515 Inventory
- 650.517 Incorporation by Reference
- Comments on Notice of New Information Collection
- Executive Order 12866 (Regulatory Planning and Review), Executive Order 13563 (Improving Regulation and Regulatory Review), and DOT Regulatory Policies and Procedures
- Current Cost of Tunnel Inspections
- Costs Effects of the NTIS
- Benefits Resulting From the NTIS
- Summary
- Regulatory Flexibility Act
- Unfunded Mandates Reform Act of 1995
- Executive Order 13132 (Federalism Assessment)
- Executive Order 12372 (Intergovernmental Review)
- Paperwork Reduction Act
- National Tunnel Inventory Collection
- Annual Inspection Reporting
- Estimated Total Annual Burden Hours
- National Environmental Policy Act
- Executive Order 12630 (Taking of Private Property)
- Executive Order 12988 (Civil Justice Reform)
- Executive Order 13045 (Protection of Children)
- Executive Order 13175 (Tribal Consultation)
- Executive Order 13211 (Energy Effects)
- Executive Order 12898 (Environmental Justice)
- Regulation Identification Number
- List of Subjects in 23 CFR Part 650
- PART 650—BRIDGES, STRUCTURES, AND HYDRAULICS
- Subpart E—National Tunnel Inspection Standards

- Subpart E—National Tunnel Inspection Standards
- Footnotes

## DATES:

Comments must be received on or before September 30, 2013. Late-filed comments will be considered to the extent practicable.

## ADDRESSES:

Mail or hand deliver comments to: Docket Management Facility, U.S. Department of Transportation, 1200 New Jersey Avenue SE., Washington, DC 20590, or submit electronically at <http://www.regulations.gov>, or fax comments to (202) 493-2251. All comments should include the docket number that appears in the heading of this document. All comments received will be available for examination and copying at the above address from 9 a.m. to 5 p.m., e.t., Monday through Friday, except Federal holidays. Those desiring notification of receipt of comments must include a self-addressed, stamped postcard or may print the acknowledgment page that appears after submitting comments electronically. Anyone is able to search the electronic form of all comments in any one of our dockets by the name of the individual submitting the comment (or signing the comment, if submitted on behalf of an association, business, or labor union). You may review the U.S. Department of Transportation's (DOT) complete Privacy Act Statement in the Federal Register published on April 11, 2000 (Volume 65, Number 70, Pages 19477-78), or you may visit <http://DocketsInfo.dot.gov>.

## FOR FURTHER INFORMATION CONTACT:

Mr. Jesus Rohena, Office of Bridge Technology, HIBT-10, (202) 366-4593; Mr. Joey Hartmann, Office of Bridge Technology, HIBT-10, (202) 366-4599; or Mr. Robert Black, Office of the Chief Counsel, HCC-30, (202) 366-1359, Federal Highway Administration, 1200 New Jersey Ave. SE., Washington, DC 20590.

## SUPPLEMENTARY INFORMATION:

### Electronic Access and Filing

This document, the advance notice of proposed rulemaking (ANPRM), NPRM, and all comments received may be viewed online through the Federal eRulemaking portal at <http://www.regulations.gov>. The Web site is available 24 hours each day, 365 days each year. An electronic copy of this

document may also be downloaded by accessing the Office of the Federal Register's home page at: <https://www.federalregister.gov>.

## Executive Summary

### I. Purpose of the Regulatory Action

This regulatory action seeks to establish national standards for tunnel inspections consistent with the provisions of MAP-21, which includes requirements for establishing a highway tunnel inspection program, maintaining a tunnel inventory, and reporting to FHWA of inspection results and, in particular, critical findings, meaning any structural or safety-related deficiencies that require immediate follow-up inspection or action. The NTIS proposed in this SNPRM apply to all structures defined as highway tunnels on all public roads, on and off Federal-aid highways, including tribally and federally owned tunnels.

Routine and thorough inspections of our Nation's tunnels are necessary to maintain safe tunnel operation and prevent structural, geotechnical, and functional failures. In addition, data on the condition and operation of our Nation's tunnels is necessary in order for tunnel owners to make informed investment decisions as part of an asset management program for maintenance and repair of their tunnels. Recognizing that the safety and security of our Nation's tunnels are of paramount importance, Congress declared in MAP-21 that it is in the vital interest of the United States to inventory, inspect, and improve the condition of the Nation's highway tunnels. As a result of this declaration and the authority established by MAP-21 in 23 U.S.C. 144, FHWA is proposing the NTIS.

### II. Summary of the Major Provisions of the Regulatory Action in Question

The NTIS proposes the establishment of a national tunnel inventory; routine inspections of tunnels on all public roads, on and off Federal-aid highways, including tribally and federally owned tunnels; written reports to FHWA of critical findings, as defined in 23 CFR 650.305; training for tunnel inspectors; a national certification program for tunnel inspectors; and the timely correction of any deficiencies.

Section 650.503 describes the applicability of the proposed NTIS as authorized by MAP-21.

Section 650.507 describes the organizational requirements associated with successful implementation of the proposed NTIS. Tunnel inspection organizations would be required to develop and maintain inspection policies and procedures, ensure that inspections are conducted in accordance with the

proposed standards, collect and maintain inspection data, and maintain a registry of nationally certified tunnel inspection staff.

Section 650.509 proposes certain minimum qualifications for tunnel inspection personnel. A Program Manager would, at a minimum, be a registered Professional Engineer (P.E.), have 10 years of tunnel or bridge inspection experience, and be a nationally certified tunnel inspector. The Team Leader would be a registered P.E. and a nationally certified tunnel inspector. This section also describes the proposed requirements for national certification of inspection staff.

Section 650.511 proposes a minimum inspection frequency of 24 months for routine tunnel inspections. An owner would be permitted to increase or decrease the frequency of inspection of particular components based on the age, condition, or complexity of those components.

Section 650.513 proposes the establishment of a statewide, Federal agencywide, or tribal governmentwide procedure to ensure that critical findings, as defined in 23 CFR 650.305, are addressed in a timely manner. Owners would be required to notify FHWA within 24 hours of identifying acritical finding and the actions taken to resolve or monitor that finding. This section also discusses proposed inspection procedures for complex tunnels, load rating of tunnels, quality assurance/quality control procedures, and the inspection of functional systems.

Section 650.515 defines certain inventory data information to be collected and reported for all tunnels subject to the NTIS within 120 days of the effective date of this proposed rule. This data would be used to create a national inventory of tunnels that would result in a more accurate assessment and provide the public with a more transparent view of the number and condition of the Nation's tunnels.

### III. Costs and Benefits

The FHWA only has limited data regarding the number of highway tunnels in the Nation, the frequencies at which those tunnels are inspected, and the costs associated with their inspection. The FHWA received some data from a 2003 informal survey FHWA conducted of tunnel owners.<sup>[1]</sup> Throughout this SNPRM, FHWA relies on the data received from that survey in order to develop estimates of the costs and benefits of this rulemaking. The FHWA expects that there may be some tunnels that could be covered by the expanded scope of this rulemaking that were not included in the survey's limited data set; however, we believe that those tunnels would only be a fraction of the total cost and that the 2003 survey data provide a sufficient basis for FHWA's analysis throughout this SNPRM. We seek specific comment on this issue.

The FHWA expects that the overall increase in tunnel inspection costs across the Nation will be modest, as the vast majority of tunnel owners already inspect at the 24-month interval required by the NTIS. The FHWA does not have any information regarding the cost of fixing critical findings

that are uncovered as a result of provisions in this rulemaking. Based on current data, only two tunnel owners, that together own 15 tunnels (bores), would be required to increase their current inspection frequency as a result of the requirements proposed in this SNPRM. The FHWA is proposing this action because ensuring timely inspections of highway tunnels would not only enhance the safe passage of the traveling public, it would also protect investments in key infrastructure, as early detection of problems in tunnels will likely increase the longevity of these assets. The FHWA does not have sufficient information to quantify the benefits of this rulemaking, and as such is not able to determine if there are net benefits. We seek comments on benefits resulting from this rulemaking, the costs associated with fixing critical findings that are identified during inspections, as well as the costs of re-routing or closing traffic in order to conduct the inspections.

## Background

### I. Changes to the Proposed Rule Required by MAP-21

The FHWA previously proposed the NTIS in an NPRM published in the Federal Register on July 22, 2010, at [75 FR 42643](#). That proposal did not address the provisions for national standards for tunnel inspections detailed in the subsequently enacted MAP-21. As a result, FHWA is issuing this SNPRM to request comment on a revised NTIS proposal that incorporates the provisions required by MAP-21.

In Section 1111(a) of MAP-21, Congress declared that it is in the vital interest of the United States to inventory, inspect, and improve the condition of the highway tunnels of the United States.

Section 1111(b) broadens the authority of the NTIS previously proposed in the NPRM and extends that authority to tunnels owned or operated by tribal governments.

Section 1111(d) requires annual revisions be made to the inventory of tunnel data collected under MAP-21 authority and reporting on that inventory to Congress.

Section 1111(h) requires the Secretary to establish inspection standards to ensure uniformity of inspections and evaluations, to define a maximum time period between inspections, to detail the qualifications required for those charged with carrying out the inspections, to require that appropriate records are retained, and to create a procedure for national certification of highway tunnel inspectors. As a result, provisions are now proposed in this SNPRM for the certification of national tunnel inspectors.

Section 1111(h) also requires the establishment of procedures to conduct reviews of State compliance with NTIS, as well as for the reporting of critical findings, as defined in [23 CFR 650.305](#), and any monitoring or corrective actions taken in response to critical findings. As a result,

provisions are now proposed in this SNPRM that describe how State compliance will be determined and when and how often reporting to the FHWA on critical findings, and any follow-up actions taken in response to those findings, are required.

Section 1111(i) requires that training programs be established for tunnel inspectors. In response, the SNPRM now includes provisions that require approved training for Program Managers, Team Leaders, and inspectors.

## II. Need for Tunnel Inspection Standards

The majority of road tunnels in the United States were constructed during two distinct periods of highway system expansion. A significant number of these tunnels were constructed in the 1930s and 1940s as part of public works programs associated with recovery from the Great Depression. Another significant number were constructed for the developing Interstate Highway System in the 1950s and 1960s. As a result, most of these structures have exceeded their designed service lives and need to be routinely inspected in order to ensure continued safe and efficient operation.

The structural, geotechnical, and functional (electrical, mechanical, and other) components and systems that make up tunnels are subjected to deterioration and corrosion due to the harsh environment in which these structures are operated. As a result, routine and thorough inspection of these elements is necessary to collect the data needed to maintain safe tunnel operation and to prevent structural, geotechnical, and functional failures. As our Nation's tunnels continue to age, an accurate and thorough assessment of each tunnel's condition is critical to avoid a decline in service and maintain a safe, functional, and reliable highway system.

In addition to ensuring safety, it is also necessary to collect data on the condition and operation of our Nation's tunnels in order for owners to make informed investment decisions as part of a systematic integrated transportation asset management approach. Without such an approach, ensuring an accountable and sustainable practice of maintenance, preservation, rehabilitation, or replacement across an inventory of tunnels is a significant challenge. Data-driven asset management provides tunnel owners with a proven framework to demonstrate long-term accountability and accomplishment. To meet the needs of this management approach, the data collected needs to be robust enough to support these investment decisions within a State and consistent enough across the Nation to identify trends in performance and demonstrate the linkages between Federal transportation expenditures and transportation agency programmatic results.

Timely and reliable tunnel inspection is vital to uncovering safety problems and preventing failures. When corrosion or leakage occurs, electrical or mechanical systems malfunction, or concrete cracking and spalling signs appear, they may be symptomatic of problems. The importance of tunnel inspection was demonstrated in the summer of 2007 in the I-70 Hanging Lake tunnel in Colorado when a ceiling and roof inspection uncovered a crack in the roof that was compromising the



structural integrity of the tunnel. This discovery prompted the closure of the tunnel for several months for needed repairs. The repairs prevented a potential catastrophic tunnel failure and loss of life. That potential catastrophe could have resulted in the need for an even longer period of repairs, and also may have resulted in injuries and deaths.

Unfortunately, loss of life was not avoided in Oregon in 1999. In January of that year, a portion of the lining of the Sunset Tunnel located near Manning, west of Portland, collapsed, killing an Oregon Department of Transportation (ODOT) employee. At the time of the collapse, the lining was being inspected to ensure its safety after a heavy rain in response to a report by a concerned traveler on the highway that passes through the tunnel. The extent of deterioration in the lining had not been identified and regularly documented in previous inspections of the tunnel, which occurred variably. As a result, the lining had deteriorated to the point that the safety inspection after the rain event was sufficient to trigger the collapse. Following the accident, ODOT reviewed their tunnel inspection program and identified a need to define what a tunnel is, establish the criteria to be used to inspect a tunnel, define the professional qualifications needed for a tunnel inspector, and to create tunnel inspection procedures.

Inadequate tunnel inspection was again linked to a loss of life in Massachusetts in 2006. In July of that year, a portion of the suspended ceiling collapsed onto the roadway in the I-90 Central Artery Tunnel in Boston, killing a motorist. It also resulted in closure of this portion of the tunnel for 6 months while repairs were made, causing significant traffic delays and productivity losses. The National Transportation Safety Board (NTSB) stated in its accident investigation report that, “had the Massachusetts Turnpike Authority, at regular intervals between November 2003 and July 2006, inspected the area above the suspended ceilings in the D Street portal tunnels, the anchor creep that led to this accident would likely have been detected, and action could have been taken that would have prevented this accident.”<sup>[2]</sup> Among its recommendations, NTSB suggested that FHWA seek legislative authority to establish a mandatory tunnel inspection program similar to the National Bridge Inspection Standards (NBIS) that would identify critical inspection elements and specify an appropriate inspection frequency. Additionally, the DOT Inspector General (IG), in testimony before Congress in October 2007, highlighted the need for a tunnel inspection and reporting system to ensure the safety of the Nation's tunnels, stating that FHWA “should develop and implement a system to ensure that States inspect and report on tunnel conditions.” The IG went on to state that FHWA should establish rigorous inspection standards.<sup>[3]</sup>

More recently, inspection of ceiling panels in the westbound I-264 Downtown Tunnel in Portsmouth, Virginia, prevented a catastrophic failure. The Virginia Department of Transportation (VDOT) routinely performs an in-depth inspection of this tunnel at approximate intervals of 5 to 7 years. During an inspection in 2009, VDOT personnel found aggressive corrosion of embedded bolts used to support the ceiling panels over the roadway. Upon further evaluation, it was determined that the ceiling panels needed to be removed to ensure the safety of the traveling public. The tunnel was completely closed for six consecutive weekends in order to perform this

maintenance activity. If there had not been a timely inspection, the corrosion would have worsened and there would likely have been a collapse that could have caused death, injuries, or property damage, and potentially complete closure of the tunnel for an extended period of time, resulting in significant productivity losses.

Most recently, on December 2, 2012, the suspended ceiling in Japan's Sasago Tunnel collapsed onto the roadway below crushing several cars, resulting in the deaths of nine motorists. Early reports in the media citing Japanese officials have indicated that the collapse is likely the result of the failure of the anchor bolts that connected the suspended ceiling to the tunnel roof. According to the Central Japan Expressway Company, which is responsible for the operation of the tunnel, those connections had not been thoroughly inspected due to issues with access.<sup>[4]</sup>

The FHWA estimates that tunnels represent nearly 100 miles—approximately 517,000 linear feet—of Interstates, State routes, and local routes. Tunnels such as the Central Artery Tunnel in Massachusetts, the Lincoln Tunnel in New York, and the Fort McHenry and the Baltimore Harbor Tunnels in Maryland are a vital part of the national transportation infrastructure. These tunnels accommodate huge volumes of daily traffic, contributing to the Nation's mobility. For example, according to the Port Authority of New York and New Jersey, the Lincoln Tunnel carries approximately 120,000 vehicles per day, making it the busiest vehicular tunnel in the world. The Fort McHenry Tunnel handles a daily traffic volume of more than 115,000 vehicles. Any disruption of traffic in these or other highly traveled tunnels would result in a significant loss of productivity and have severe financial impacts on a large region of the country.

On October 29, 2012, flooding caused by Hurricane Sandy led to the closure of many of the vehicular, transit, and rail tunnels in the New York City metropolitan area. Although it is still too early to quantify the economic impact of these tunnel closures, it is expected that the economic impact was substantial. Amtrak alone reported an operational loss of approximately \$60 million due to the closures of four of its tunnels in the region.<sup>[5]</sup> These closings, although the result of an extreme event and not a structural or functional safety issue, demonstrate the value of the continued operation of tunnels. Because of their importance to local, regional, and national economies, and to our national defense, it is imperative that we properly inspect and maintain tunnels to ensure the continued safe passage of the traveling public and commercial goods and services.

Of particular concern is the possibility of a fire emergency in one of our Nation's tunnels. Numerous domestic and international incidents demonstrate that tunnel fires often result in a large number of fatalities. One of the domestic examples occurred in April 1982 when seven people lost their lives in the Caldecott tunnel which carries State Route 24 between Oakland and Orinda, California, when a truck carrying flammable liquid was involved in a crash and subsequent collision with other vehicles. In October 2001, 11 people were killed when a fire erupted in the Gotthard tunnel in Switzerland following a head-on collision. In 2000, 162 people were killed when a fire started in the Kaprun train tunnel in Austria. In 1999, 39 people died when a truck caught fire in the Mont Blanc tunnel

on the France/Italy border. Tests of 26 tunnels in 13 European countries in 2010 by the European Tunnel Assessment Programme indicated a number of inadequacies related to fire safety, including missing hydrants, no barriers to close the tunnel, inadequate lighting, and insufficient escape route signs.<sup>[6]</sup> National inspection standards are needed in the United States to ensure that lights, signs, barriers, and tunnel walls are inspected and fire suppression systems are maintained in safe and operable condition. Such safety features are of critical importance in the event of a fire emergency.

Ensuring timely inspections of highway tunnels would not only enhance the safe passage of the traveling public, it could also contribute to the efficient movement of goods and people and to millions of dollars in fuel savings. For example, the Eisenhower/Johnson Memorial Tunnels, located west of Denver on I-70, facilitate the movement of people and goods from the eastern slope of the Rocky Mountains to the western slope. The Colorado Department of Transportation (CDOT) estimates that the public saves 9.1 miles by traveling through these tunnels instead of over U.S. Highway 6, Loveland Pass. In the year 2000, approximately 28,000 vehicles traveled through the tunnels per day, which is equal to 10.3 million vehicles for the year.<sup>[7]</sup> Accordingly, FHWA estimates that by traveling through the Eisenhower/Johnson Memorial Tunnels, the public saved approximately 90.7 million miles of travel and millions of dollars in associated fuel costs in the year 2000. These tunnels help to expedite the transport of goods and people, prevent congestion along alternative routes, and save users both dollars and fuel. If these tunnels were closed due to a collapse or other safety hazard, the economic effects would be considerable.

While the above examples do not constitute a comprehensive list of issues resulting from lack of inspections, these examples do demonstrate why routine and thorough tunnel inspection is vital to uncovering safety problems and preventing catastrophic failure of key tunnel components. Some of these tunnel operators have already taken adequate steps, such as increasing frequency of inspections, in order to address these problems. These are simply examples of why tunnel inspections are important. These examples of the costs of tunnel failures and closures are not necessarily benefits resulting from this rulemaking, because the operators have in some cases already taken steps absent this current rulemaking to improve inspection procedures.

### III. Research Related to Tunnel Inspections

In addition to the focus Congress has given to tunnel inspection, the NTSB, State departments of transportation (State DOTs), the IG, the FHWA, and others have conducted extensive research related to tunnel design, construction, rehabilitation, and inspection. The following partial listing of those activities and projects related to tunnel safety all underscore the need to develop consistent and reliable inspection standards.

A. Underground Transportation Systems in Europe: Safety, Operations, and Emergency Response.<sup>[8]</sup> In 2005, FHWA, the American Association of State Highway and Transportation Officials (AASHTO), and the National Cooperative Highway Research Program (NCHRP) sponsored a study

of equipment, systems, and procedures used in the operation and management of tunnels in nine European countries (Austria, Denmark, France, Germany, Italy, Norway, the Netherlands, Sweden, and Switzerland). One objective of this scan was to identify best practices, specialized technologies, and standards used in monitoring or inspecting the structural elements and operating equipment of roadway tunnels to ensure optimal performance and minimize downtime for maintenance or rehabilitation. As a result of their fact finding, the international scan team recommended that the United States implement a risk-management approach to tunnel inspection and maintenance. In regard to current practices, the report states that “only limited national guidelines, standards, or specifications are available for tunnel design, construction, safety inspection, traffic and incident management, maintenance, security, and protection against natural or manmade disasters.” The report also notes that only “through knowledge of the systems and the structure gained from intelligent monitoring and analysis of the collected data, the owner can use a risk-based approach to schedule the time and frequency of inspections and establish priorities.”

B. NCHRP Project 20-07/Task 261, Best Practices for Implementing Quality Control and Quality Assurance for Tunnel Inspection.<sup>191</sup>—In response to NTSB's preliminary safety recommendations resulting from the I-90 Central Artery Tunnel partial ceiling collapse investigation in Boston, FHWA and AASHTO initiated this NCHRP research project. The objective of this project was to develop guidelines for owners to use in implementing quality control and quality assurance practices for tunnel inspection, operational safety and emergency response systems testing, and inventory procedures to improve the safety of highway tunnels. During the course of the project, the researchers found that tunnel owners in the United States are inspecting their structures at variable intervals ranging from more than a week to up to 6 years. The report states that “[s]ince there is currently no consistency in the tunnel inspection techniques used by the various tunnel owners, implementing NTIS and developing a tunnel inspector training program on applying those standards will be vital to ensuring a consistent tunnel inspection program for all tunnels across the nation.”

C. Best Practices for Roadway Tunnel Design, Construction, Maintenance, Inspection, and Operations.<sup>101</sup>—This domestic scanning tour was conducted during August and September of 2009, and is another activity that FHWA conducted in partnership with AASHTO and NCHRP to determine if a need existed for national tunnel inspection standards and a national tunnel inventory. The scan focused on the inventory criteria used by highway tunnel owners; highway tunnel design and construction standards used by State DOTs and other tunnel owners; maintenance and inspection practices; operations, including safety, as related to emergency response capability; and specialized tunnel technologies. The scan team found that the most effective tunnel inspection programs have been developed from similar bridge inspection programs. It was determined that tunnel owners often use bridge inspectors to inspect their tunnels because bridges and tunnels are transportation structures that are designed and constructed with similar materials and methods, exposed to similar environments, and can be reliably inspected with similar technologies. As a result, the scan team recommended that the development of a tunnel inspection program be as similar as

possible to the current bridge inspection program to further capitalize on the success of the standards for bridge inspection established through the NBIS.

D. In 2003, FHWA conducted an informal survey to collect information about the tunnel inventory, maintenance practices, inspection practices, and tunnel management practices of each State. Of the 45 highway tunnel owners surveyed, 40 responses were received. The survey results suggest that there are approximately 350 highway tunnels (bores) in the Nation and that they are currently inspected by their owners at frequencies that range from daily to once every 10 years.<sup>[11]</sup> The average inspection interval for the 37 responses that included data on this measure was a little over 24 months (2.05 years).

E. *Highway and Rail Transit Tunnel Inspection Manual* (HRTTIM). Recognizing that tunnel owners are not required to inspect tunnels routinely and that inspection methods vary among entities that inspect tunnels, FHWA and the Federal Transit Administration developed the HRTTIM for the inspection of tunnels in 2003. These guidelines, which were updated in 2005,<sup>[12]</sup> outline recommended procedures and practices for the inspection, documentation, and priority classification of deficiencies for various elements that comprise a tunnel.

## IV. Proposed NTIS

Recognizing that the safety and security of our Nation's tunnels are of paramount importance and as a result of the legislative mandate in MAP-21, FHWA has developed the NTIS proposed in this SNPRM. The FHWA has modeled the proposed NTIS after the existing NBIS, located at **23 CFR part 650**, subpart C. The more than 40-year history of NBIS has enabled the States to identify and manage deterioration and the emergence of previously unknown problems in their bridge inventory, to evaluate those structures properly, and to make the repairs needed to forestall the escalating cost of repairing or replacing older bridges. Similar needs and concerns exist for the owners of aging highway tunnels. The NBIS provides a reasonable starting point for designing a national tunnel inspection program. The FHWA has therefore modeled the proposed NTIS after the NBIS, and will make appropriate changes in the NTIS as we gather further experience with tunnel inspections and tunnel safety problems. It is proposed that the NTIS will be added under subpart E of **23 CFR part 650**—Bridges, Structures, and Hydraulics.

The proposed NTIS requires the proper safety inspection and evaluation of all tunnels. The NTIS are needed to ensure that all structural, mechanical, electrical, hydraulic and ventilation systems, and other major elements of our Nation's tunnels are inspected and tested on a regular basis. The NTIS would also enhance the safety of our Nation's highway tunnels, and will make tunnel inspections consistent across the Nation.

The proposed NTIS would create a national inventory of tunnels that would result in a more accurate assessment and provide the public with a more transparent view of the number and

condition of the Nation's tunnels. Tunnel information would be made available to the public in the same way that bridge data contained in the National Bridge Inventory is made available. The tunnel inventory data would also be available in the annual report to Congress that is required by MAP-21. The tunnel inventory data would allow FHWA to track and identify any patterns of tunnel deficiencies and facilitate repairs by States to ensure the safety of the public. Tunnel owners would also be able to integrate tunnel inventory data into an asset management program for maintenance and repairs of their tunnels. The data collection requirements in the proposed NTIS are consistent with the performance-based approach in carrying out the Federal highway program established by Congress in MAP-21. These proposed requirements would fulfill the congressional directive to establish a data-driven, risk-based approach for the maintenance, replacement, and rehabilitation of highway tunnels. Such an approach would help to ensure the efficient and effective use of Federal resources.

The proposed NTIS will ensure that tunnels are inspected by qualified personnel by creating a certification program for tunnel inspectors and a comprehensive training course.

## Regulatory History

The FHWA issued an ANPRM on November 18, 2008, ([73 FR 68365](#)) to solicit public comments regarding 14 categories of information related to tunnel inspections to help FHWA develop the NTIS. The FHWA reviewed and analyzed the comments received in response to the ANPRM and published an NPRM on July 22, 2010 ([75 FR 42643](#)). In the NPRM, FHWA proposed establishing the NTIS based in part on the comments received in response to the ANPRM. The FHWA received comments on the docket for the NPRM from 16 commenters, including: 1 Federal agency (NTSB); 7 State DOTs (California, Colorado, Indiana, Massachusetts, Pennsylvania, Virginia, and Washington); 1 engineering consulting firm (PB Americas); 4 organizations (American Society of Civil Engineers (ASCE), AASHTO, American Council of Engineering Companies (ACEC), and National Fire Protection Association (NFPA)); 1 local government agency (The Seattle Fire Department); 1 private corporation (Damascus Corp.) and 1 anonymous commenter. This SNPRM addresses the comments received on the NPRM and updates the proposed regulation for the provisions detailed in MAP-21.

## Section-by-Section Analysis

### 650.501 Purpose

The purpose for the NTIS was amended to be consistent with the requirements of MAP-21. The purpose of the NTIS is to ensure the proper safety inspection and evaluation of all tunnels.

The CDOT commented that it concurs with limiting the applicability to only Federal-aid built or renovated tunnels as was proposed in the NPRM. The CDOT also commented that the scope of the NTIS should be limited to those tunnels that were built or rehabilitated with title 23 funds and this limitation should continue until title 23 funds can be used to inspect off-system tunnels similar to the exception that exists for off-system bridges.

*The FHWA Response:* With the passage of MAP-21, FHWA is now proposing the inspection of all tunnels on public roads regardless of whether they were constructed or renovated using Federal funds. The MAP-21 also provides the flexibility to leverage funding for these inspections that CDOT requested.

## **650.503Applicability**

The applicability for the NTIS would be amended to be consistent with the requirements of MAP-21. The applicability of NTIS would be broadened to all tunnels regardless of their funding source.

The California Department of Transportation (Caltrans) indicated there might be insufficient data to determine which tunnels have been built or renovated with title 23 funds.

*The FHWA Response:* With the passage of MAP-21, FHWA is now proposing the inspection of all tunnels on public roads, and tunnels on and off the Federal-aid highway system regardless of whether they were constructed or renovated using Federal funds.

The AASHTO commented that these regulations will require State DOTs to provide oversight of inspection of Federal tunnels.

*The FHWA Response:* The SNPRM does not require States to provide oversight of inspection of federally owned tunnels. The Federal agency that owns a particular tunnel is responsible for providing oversight of the tunnel inspection.

The NTSB commented that FHWA should continue seeking the legislative authority to require that all publicly used highway tunnels are subject to the NTIS. The NTSB commented that their experience with accident investigations leads them to believe that only a mandatory NTIS that applies to all highway tunnels on public roads will adequately protect the public.

*The FHWA Response:* With the passage of MAP-21, FHWA now has a legislative mandate to require the inspection of all tunnels on public roads on and off Federal-aid highways, including tribally and federally owned tunnels.

## **650.505Definitions**

*At-grade Roadway.* A definition for *at-grade roadway* was added to the proposed rule in order to respond to a comment from AASHTO. See the section-by-section analysis discussion for § 650.513.

*Complex Tunnel.* Massachusetts Department of Transportation (MassDOT) and AASHTO suggested that the definition of *complex tunnel* take into account complex highway geometry, including the presence of on and off ramps in the middle of a tunnel such as those found in Boston's I-90 and I-93 tunnels.

*The FHWA response:* The FHWA would not object to an owner classifying a tunnel in its inventory with complex highway geometry as a complex tunnel. However, FHWA does not believe it is necessary to change the definition of complex tunnel in the proposed rule to accommodate this classification.

*Comprehensive tunnel inspection training.* A definition for comprehensive tunnel inspection training was added to the proposed rule in order to define the criteria for a nationally certified tunnel inspector.

*Functional Systems.* The Seattle Fire Department suggested dividing the definition of *functional systems* into two subcategories: (1) Fire and life safety systems, and (2) non-fire and life safety systems. The Seattle Fire Department commented that this division will clarify inspection standards and the need for inspection frequency detailed in § 650.511.

*The FHWA response:* The FHWA does not believe it is necessary to divide the definition of *functional system* into two subcategories in order to ensure appropriate inspection standards and frequencies are applied. The FHWA is aware of the complexity and extensive number of non-structural elements and systems that are necessary for fire and life safety and those for non-fire and life safety. However, because it is not possible to create an all-inclusive list of functional system elements, FHWA attempted to capture the most important systems as a general listing in the NPRM. The requirement to develop procedures, including determining the inspection frequency of all systems and elements installed in a tunnel, proposed in § 650.513 provides assurance that inspection standards and frequencies will be applied appropriately.

*Highway and Rail Transit Tunnel Inspection Manual (HRTTIM).* The definition for the HRTTIM was removed from this section because the document is no longer being incorporated by reference in the proposed rule.

*In-Depth Inspection.* The Washington State Department of Transportation (WSDOT) commented that the phrase “structural element” within this definition needs to include unlined tunnels, portal rock structures, and rock ceilings, and that the Team Leader inspecting these elements should be required to be a geotechnical engineer.

*The FHWA response:* It is the intent of FHWA that the term “structural element” includes the features of a tunnel that provide its structure. As such, the walls, ceilings, and portals of unlined tunnels would be included. The FHWA does not believe the Team Leader must be a geotechnical



engineer, as § 650.513(f) provides that the Team Leader is required to construct a team with the necessary expertise to inspect geotechnical features and report the findings. It is not necessary for the Team Leader to have the capacity to effectively inspect geotechnical features, provided a member of the team is able to do so.

The Seattle Fire Department stated there is no definition of the term “inspection” in the rule and that this will lead to confusion by the tunnel owner/operator as to the intent and method of the inspection program.

*The FHWA response:* To eliminate potential for confusion regarding the term inspection, § 650.513(c) and (d) establish a clear division of inspection and testing responsibilities. Section 650.513(d) proposes to require each State DOT, Federal agency, or tribal government tunnel inspection organization to establish requirements for routine diagnostic testing of functional systems, which could be done by operation or maintenance personnel. Section 650.513(c) proposes to require that the procedures define how, when, and by whom these systems will be inspected and tested. It is expected that, as part of an inspection, the Team Leader will verify that this routine diagnostic testing had been accomplished and that the aforementioned procedures had been followed.

*Initial Inspection.* The VDOT proposed that for existing tunnels, any inspection that was performed in the last 5 years should qualify as the tunnel's *initial inspection*.

*The FHWA response:* The FHWA disagrees with the commenter. To allow States and tunnel owners greater flexibility in performing a tunnel's initial inspection, we have proposed to extend the initial inspection requirement to 24 months under § 650.511(a). Using inspection data that is 5 years old, in combination with an initial inspection requirement of 24 months for existing tunnels, could result in a tunnel not being inspected for a period of 7 years. Thus, FHWA is proposing that the initial inspection be conducted within 24 months of the effective date of this rule and that no inspection data previous to the publishing of this rule will be accepted to fulfill the requirements of this section.

*Inspection Date.* A definition for *inspection date* was added in order to make revisions to § 650.511 on inspection interval clearer.

*Load Rating.* The AASHTO, VDOT, and the Pennsylvania Department of Transportation (PennDOT) suggested revising the definition of *load rating* to include the determination of non-vehicular type capacities, such as hanger systems for suspended ceilings or other structural systems. The WSDOT commented that rating “lid type tunnels” might be confused with bridges and asked for clarification regarding how they will be distinguished and reported to the database.

*The FHWA response:* The current definition of *load rating* in **23 CFR part 650**, subpart C—National Bridge Inspection Standards is the determination of the live load carrying capacity of a bridge using bridge plans and supplemented by information gathered from a field inspection. The current

definition of *load rating* in the AASHTO Manual for Bridge Evaluation is “the determination of the live-load carrying capacity of an existing bridge.” As the proposed definition for *load rating* in this rule is consistent with 23 CFR 650.305 and the AASHTO Manual, FHWA declines the changes suggested by AASHTO, VDOT, and PennDOT. In addition, the commenters' suggested definition effectively incorporates structural evaluation, which is separate from load rating. This evaluation can be required by the owner at any time and should occur automatically if damage or deterioration with the potential to affect performance is detected through an inspection.

With regard to “lid type tunnels,” per the proposed definition of tunnel in this rule, owners would be required to classify a structure as either a tunnel or a bridge and that classification would determine the appropriate procedures by which to rate the structure. For example, if a tunnel roof serves as a roadway for traffic above the tunnel, that roof should be load rated as part of the tunnel and not as an independent bridge.

*Procedures.* A definition for *procedures* was added to the rule in order to clarify what FHWA means by this term which is used extensively throughout this rule.

*Professional Engineer (P.E.).* Language was added to the definition of *professional engineer* to clarify that engineers are bound by their ethics to practice only in those areas where they have the necessary experience, in response to a comment from VDOT on the qualifications of a *Team Leader*. See discussion on the definition of *Team Leader* in this section.

*Routine Permit Load.* The VDOT suggested revising the term *routine permit load* to simply *permit load*. The AASHTO suggested that permit loads that are not “routine” should also be defined.

*The FHWA response:* The FHWA believes the definition proposed in this rule is consistent with that used in the NBIS and is commonly accepted, understood, and used within the bridge and tunnel community. *Routine permit loads* need to be defined for the purposes of this proposed rule because they are used to conduct load ratings. For the purposes of this proposed rule, it is unnecessary to provide a definition of permit loads that are outside of routine because they are not used to conduct load rating per this rule.

*Team Leader.* The VDOT suggested revising the definition for *Team Leader* to read, “The on-site individual in charge of an inspection team responsible for planning, preparing, performing, and reporting on tunnel inspections. The Team Leader shall be a registered P.E. in the technical discipline for which he/she is inspecting. For example, Team Leader for inspecting electric systems shall be a P.E. in Electrical Engineering.”

*The FHWA response:* The FHWA agrees that inspection teams need to be comprised of individuals qualified to inspect the elements that they are inspecting. As these inspections will leverage multiple disciplines, team members with diverse sets of expertise will be required. In the proposed regulation, only one of these members will be required to be the *Team Leader*. As a result, FHWA does not

agree with altering the definition of *Team Leader* to include elements of qualification additional to those addressed in § 650.509. The *Team Leader* would be responsible for assembling a team of inspectors with appropriate expertise and experience to inspect the various elements, components, and systems that comprise the tunnel.

*Tunnel.* The NFPA recommended adopting its definitions for *road tunnel* and *length of tunnel* as defined by *NFPA 502: Standard for Road Tunnels, Bridges, and Other Limited Access Highways* (2008 Edition). The NFPA stated that the definition of tunnel does not need to contain a minimum length requirement; however, tunnels should be categorized by tunnel length. They suggest that the categories should be adopted from Section 7.2 and Table 7.2 of NFPA 502, which provides the minimum fire protection requirements for road tunnels based on tunnel length.

The ASCE recommended using the AASHTO Subcommittee on Bridges and Structures Technical Committee T-20, Tunnels definition of *tunnel*. The ASCE stated that adoption of the T-20 definition would result in regular attention to all parts of a tunnel, such as fire protection systems and auxiliary structures. The ASCE stated that this approach is important in order to ensure that all critical engineered systems in a tunnel are inspected.

Caltrans suggested that the NTIS classify as tunnels all structures requiring forced ventilation to limit carbon monoxide buildup, all structures with fire suppression systems, and all structures bored or mined through undisturbed material. Caltrans suggested that language addressing ventilation systems, fire protection systems, and type of construction be included in the definition for *tunnel*.

PB Americas proposed the following definition for *tunnel* based on roadway enclosure and length: “Any combination of structures that creates a structure that is functionally a tunnel from the viewpoint of access—An enclosed roadway which is constructed within the earth or has buildings over it, limiting access to portals for vehicular travel, and is longer than 300 feet from portal to portal.”

The Seattle Fire Department suggested additional language for the definition of *tunnel* as follows: “The owner shall ascertain the risks of the structure, traffic, hazardous material and related variables that may contribute to either structural damage or loss of life, to determine if it should be classified as a tunnel.” The Seattle Fire Department also commented that for the purposes of this inspection program, any structure that includes components of the fire and life safety systems shall be considered part of the tunnel, including control facilities and ventilation buildings.

The AASHTO emphasized the need for clarity in the definition of *tunnel* to avoid confusion in reporting and inspection. They suggested the following definition: “An enclosed roadway for motor vehicle traffic with vehicle access limited to portals regardless of type of structure or method of construction. Tunnels do not include bridges or culverts that an owner has elected to inspect under the NBIS (23 CFR 650 Subpart C—National Bridge Inspection Standards).”

*The FHWA response:* The FHWA believes the modified version of the AASHTO T-20 definition is adequate to capture the structures targeted with this proposed regulation without overly complicating the determination of what is or is not a *tunnel*. Consistent with the majority of the comments, this definition does not include a minimum length. The FHWA believes that including categories for tunnels, or additional detailed language on functional systems or type of construction, narrows what is intended to be a fairly broad definition. Also, the definition for *complex tunnel* addresses advanced or unique structural elements or functional systems. The current definition clearly states that a structure shall be inspected and reported only once under either the NBIS or the NTIS, but not both.

*Tunnel inspection refresher training.* A definition for tunnel inspector refresher training was added to the proposed rule to define the criteria for a nationally certified tunnel inspector.

*Tunnel Operations, Maintenance, Inspection and Evaluation (TOMIE) Manual.* A definition for the TOMIE manual was added as this document is now incorporated by reference into the proposed rule. The TOMIE Manual has replaced the HRTTIM as a reference for this proposed regulation because the recommendations and guidance in the TOMIE Manual are consistent with this proposed regulation and MAP-21. Also, the TOMIE Manual is based on an element level inspection approach. The TOMIE Manual is posted for public viewing in the rulemaking docket and on the FHWA Web site (<http://www.fhwa.dot.gov/bridge/tunnel/library.htm>). The FHWA specifically requests comments on the TOMIE Manual from tunnel owners and operators in consideration of this proposed regulation.

*Tunnel Inspection Experience.* The AASHTO suggests adding language to the definition of *tunnel inspection experience* to clarify how a year of experience will be defined.

*The FHWA response:* The FHWA added language to clarify the criteria to be used in evaluating years of experience under § 650.509(a), including the relevance of the individual's actual experience, exposure to problems or deficiencies common in the types of tunnels inspected by the individual, complexity of tunnels inspected relative to the individual's skills and knowledge, and the individual's understanding of data collection needs and requirements.

*Tunnel-specific inspection procedures.* A definition for *tunnel-specific inspection procedures* was added to this proposed rule in order to respond to a comment from AASHTO. See the section-by-section analysis discussion for § 650.513.

## **650.507Tunnel Inspection Organization**

This section of the proposed rule was amended to be consistent with the requirements of MAP-21. The proposed rule requirement that States and Federal agencies inspect or cause to be inspected all tunnels that are fully or partially within their responsibility or jurisdiction was extended to tribally owned tunnels. Also, tunnel inspection organizations would be required to maintain a registry of nationally certified tunnel inspectors that work in their jurisdiction.

The AASHTO, MassDOT, and VDOT expressed concern that this proposed rule places the responsibility for inspecting tunnels within a State's boundaries on the State DOT. This would be the case even though a number of major tunnels on Federal-aid highways are owned and operated by semi-autonomous authorities that were established by State legislators with statutory independence from State DOTs. The commenters worried that, as a result, these regulations will place State DOTs in the awkward position of being responsible for an oversight task that they have no legal authority to perform. The VDOT further commented that tunnels owned by legal authorities should be exempted from this rule.

*The FHWA Response:* Section 650.507(a) states that each State DOT must inspect, or cause to be inspected, all tunnels subject to the NTIS. Under title 23, the FHWA's primary relationship in a State is with the State Highway Agency. Therefore, the State Highway Agency would be legally responsible for fulfilling the requirements of these proposed regulations within its State's boundaries. If current legal authority is not present within a State to carry out this responsibility, the State Highway Agency should seek that authority. As a result of this proposed rule, State DOTs would be responsible for the implementation of the NTIS on all applicable tunnels within their States with the exception of tribally and federally owned tunnels as discussed in the section-by-section analysis for § 650.505.

The AASHTO and Indiana DOT requested clarification regarding whether § 650.507 and § 650.515 require a State to maintain a tunnel inspection organization, including policies and procedures, a designated Program Manager, and inventory and reporting system, as required by § 650.507 and § 650.515, if the State does not own or possess any qualifying tunnels. Indiana DOT also asked if annual reporting to FHWA would be required to confirm that no qualifying tunnels exist.

*The FHWA Response:* Section 650.503 and § 650.507(a) would establish which tunnels are subject to the requirements of this rule. Section 650.507(d) further clarifies that a State tunnel inspection organization is only required when “one or more” tunnels subject to these regulations exists within the State. As such, a State that does not contain any tunnels subject to this proposed regulation would not be required to have a tunnel inspection organization, established inspection policies and procedures, a designated Program Manager, an inventory and reporting system, and would not be subject to annual reporting requirements.

Caltrans noted that while it has an established system for the collection of bridge inspection data and report writing, the development of a similar system for tunnel inspection is a labor intensive effort that would take several years to complete.

*The FHWA Response:* The FHWA agrees that establishing a system for collecting and reporting of tunnel inspection and inventory data would be a significant effort for tunnel owners who have not instituted an inspection program on their own. In recognition of this, FHWA has extended the initial inspection requirement to 24 months from the effective date of this proposed rule.

The ACEC commented that risk management requirements should be addressed in the final rule. More specifically, ACEC commented that liability for inspecting engineers and those preparing reports should be addressed. The ACEC suggested that the NTIS state that reports be prepared in accordance with the care and skill ordinarily used by inspectors practicing under similar conditions at the same time and in the same locality. In addition, ACEC indicated that the NTIS should make clear that inspection reports are prepared exclusively for the use of the client—the tunnel owner—and not for any other purpose. The ACEC noted that tunnel inspectors should be focused on achieving the goals of their clients and should not feel compelled to compromise or alter their work out of fear of potential liability.

*The FHWA Response:* The FHWA agrees that professional standards of care should be followed when developing and implementing tunnel-specific inspection plans and preparing inspection reports. However, these matters are sufficiently addressed by other means, including State professional engineer licensing boards, State and Federal acquisition regulations pertaining to acceptable quality levels, and consultant legal disclaimers regarding the use and limitations of prepared reports. The use of inspection reports in legal proceedings is governed by State law, over which FHWA has no control.

An anonymous commenter noted that the NTIS must address worker safety. The commenter recommended that gas detection equipment be required for each team entering a tunnel to prevent carbon dioxide and carbon monoxide exposure. The commenter further commented that head protection meeting current national consensus standards be required in instances where the structural integrity of the tunnel's roof is in question. In addition, the commenter suggested that high visibility clothing be required and that each member of the team's leadership should have requisite Occupational Safety and Health Administration (OSHA) training regarding workplace hazards present during tunnel inspections.

*The FHWA Response:* The FHWA agrees that safety is of paramount importance when accessing and inspecting tunnels and associated systems. Section 650.507(d)(1) states that the State, Federal agency, or tribal government with tunnel inspection jurisdiction is required to provide “inspection policies and procedures” which would include safety training, safe inspection procedures, and requisite inspection equipment satisfying appropriate OSHA requirements, including those applicable to confined spaces.

## **650.509 Qualifications of Personnel**

This section was amended to be consistent with the requirements of MAP-21. Under this proposed rule, Program Managers and Team Leaders are required to be nationally certified tunnel inspectors. Also, the proposed requirements for a national certified tunnel inspector were added.

The ASCE and VDOT recommended that the Program Manager be required to be a registered P.E. and meet minimum education and experience requirements.

The VDOT and PennDOT recommended that the Program Manager be required to successfully complete an FHWA-approved comprehensive tunnel inspection training course.

The AASHTO recommended that the Program Manager be a registered P.E. or have 10 years of tunnel or bridge inspection experience and successfully complete an FHWA-approved comprehensive tunnel inspection training course.

*The FHWA Response:* The FHWA is proposing to modify the qualifications of the Program Manager in § 650.509(a) to require that individual be a registered P.E., have 10 years tunnel or bridge inspection experience, and be a nationally certified tunnel inspector which has mandatory training requirements. The FHWA agrees that bridge inspection experience is relevant experience for the Program Manager to possess because of the anticipated similarities between the two inspection programs. Additionally, FHWA agrees that comprehensive training in tunnel inspection should be required for Program Manager, Team Leader, and Inspector positions. The FHWA would develop or identify sources of comprehensive tunnel inspection training for Program Managers, Team Leaders, and Inspectors. Additional considerations for evaluating past experience have been included to assist States with identifying a qualified Program Manager.

The MassDOT and AASHTO recommended that the qualifications for both Program Manager and Team Leader be the same as those required under the NBIS. The MassDOT and AASHTO further recommended that if a P.E. is required, it should be required for both the Program Manager and the Team Leader, and that the Team Leader should be a P.E. registered in the discipline of the system that his or her team will be inspecting.

The ACEC recommended that both the Program Manager and the Team Leader be required to have a P.E.

The VDOT recommended that the Team Leader be a registered P.E. in the technical discipline of inspections, while WSDOT recommended that the Team Leader be licensed in the field of Geotechnical Engineering. Further, PennDOT recommended that the Team Leader be permitted to have 5 years of tunnel or bridge inspection experience as an alternative to be a registered P.E.

*The FHWA response:* Although the Program Manager and Team Leader requirements in this proposed rule are modeled after the NBIS, they differ from those of the NBIS because of the difference in the complexity of the structures that are being inspected under the NTIS.

The FHWA agrees that the Team Leader should be a registered P.E. due to the complex nature of these inspections. The Team Leader is responsible for assembling a team of inspectors with appropriate expertise and experience to inspect the various elements, components, and systems that comprise the tunnel. Accordingly, FHWA does not believe that the Team Leader needs to be

licensed in each specific discipline related to the elements being inspected. The Team Leader could have a license in any related discipline. The FHWA proposes to modify the definition for Professional Engineer in § 650.505 of the rule to emphasize that they are required to practice within their area of expertise.

## **650.511 Inspection Interval**

The title of this section has been changed to more directly reflect the content. This section has also been modified to reflect a change from the HRTTIM to the TOMIE Manual as the manual incorporated by reference and to establish a routine inspection date that will benchmark the commencement of future inspections.

The NFPA and the Seattle Fire Department recommended incorporating NFPA requirements for inspection frequencies of specific safety features into the regulation.

*The FHWA Response:* The interval between the inspection of specific safety features would be developed as part of the inspection procedures that are required under § 650.513 of the proposed rule. These procedures should include a listing of components and the associated inspection interval for each. The FHWA believes that it would be in the best interests of the tunnel owner to consult NFPA codes and standards and manufacturer recommendations in the development of the aforementioned inspection intervals.

The ASCE expressed a desire for a more flexible approach to scheduling inspections based on age and complexity, but recognized that the 24-month requirement matches the NBIS making them complementary.

*The FHWA Response:* The FHWA believes that flexibility is built into the regulation in that it establishes only a maximum inspection interval. An owner may increase the frequency of inspection of particular components of a tunnel by performing in-depth or special inspections based on the age, condition, or complexity of those components. In response to comments received, however, FHWA is proposing additional flexibility by including language in § 650.511(b) supporting an extended inspection interval of up to 48 months for tunnels that meet certain criteria. The Program Manager would be permitted, under the proposed rule, to develop an extended inspection interval program and submit to FHWA for review and comment prior to use, the criteria used to determine frequency of inspection based on assessed lesser risk, considering at a minimum: tunnel age, time from last major rehabilitation, tunnel complexity, traffic characteristics, geotechnical conditions, functional systems, and known deficiencies.

The FHWA has also modified § 650.511 to allow the inspection to take place within a defined interval 2 months before or after an established inspection date. This would offer additional flexibility in scheduling inspections to accommodate scheduling adjustments for factors including weather, personnel, or equipment issues. An inspection date would be established and could only be



modified by a Program Manager. Documentation supporting the modified date would need to be retained in the tunnel records for future reference.

PB Americas commented that a 2-year inspection frequency is adequate for most systems for a visual routine inspection. They recommended every third cycle be an in-depth hands-on sounding inspection including non-destructive and destructive testing. Additionally, they commented that following the Central Artery Tunnel collapse, they divided inspections into two categories: critical and non-critical. Critical areas were defined as areas that could cause loss of life or injury if they failed. They suggested that critical areas should be inspected annually, with non-critical areas being inspected every 2 years.

The ACEC supported a risk-based inspection process with a minimum frequency of 2 years. For the more frequent inspections identified in § 650.511(b)(2) and the damage, in-depth, and special inspections in § 650.511(c), they stated the regulation should clarify the need to specifically assess critical areas, such as structural elements or functional systems where failure would pose a life or safety issue.

*The FHWA Response:* The NPRM and this SNPRM propose a regular interval of 24 months between routine inspections. Section 650.513 of the proposed rule would require owners to establish inspection intervals in accordance with the complexity and specific characteristics of each tunnel to ensure that critical areas are inspected appropriately. The in-depth and special inspections are intended to cover situations where inspections need to be performed more frequently or a component requires a more thorough inspection. Guidance for this would be provided through reference manuals and be left to the discretion of the owner considering the age, complexity, and other factors, such as manufacturer recommendations.

The VDOT and AASHTO recommended revising the introductory language of § 650.511 to read: “Each State transportation department or Federal agency tunnel inspection organization must conduct or cause the following to be conducted for each tunnel described in § 650.503” in order to clarify whether State and local tunnels are included.

*The FHWA Response:* The FHWA agrees with this comment and has revised § 650.511 so that it is consistent with these comments and the provisions of MAP-21.

The VDOT recommended revising § 650.511(a) to require an initial inspection within 60 months of the effective date of the rule and to permit an inspection that occurred within the 60 months prior to the effective date of the rule to be accepted as the initial inspection.

The AASHTO commented that the current 12 months for initial inspection in the NPRM will be difficult to comply with if remaining tunnels within State borders have not received initial inspections in accordance with the NTIS. They note that if a tunnel was inspected prior to the effective date, the previous inspection should be sufficient. The AASHTO recommended changing

the 12 month initial inspection requirement to 24 months, and permitting an inspection within 24 months of the effective date to serve as the initial inspection. The PennDOT similarly commented that the inspection of a tunnel conducted per the HRTTIM within 24 months of the effective date of the rules should be accepted as the initial inspection.

The MassDOT and AASHTO both inquired about the timeframe for performing an initial inspection for a new tunnel.

*The FHWA Response:* There would be two instances of initial inspection. The first instance would be for existing tunnels having their first inspection under the NTIS. The second instance would be for tunnels completed after the NTIS become regulation. With regard to existing tunnels, FHWA recognizes that several tunnel owners have been performing inspections prior to this rulemaking and that there is a desire to use an inspection performed within a reasonable timeframe prior to the effective date of the rule as meeting the initial inspection requirement. While we commend these owners for their efforts and recognize that several items of the NTIS may have been met during these inspections, the NTIS would also require items be recorded for the National Tunnel Inventory. Because of these items and a need to fulfill all of the other requirements of the NTIS, FHWA believes an initial inspection should be performed after this rulemaking becomes effective. To decrease the initial inspection burden on States, however, FHWA proposes to increase the timeframe for initial inspections from 12 to 24 months. Additionally, the second instance of tunnels completed after the NTIS become regulation should have an initial inspection performed prior to opening to traffic.

The VDOT expressed concern that States would have difficulty funding the proposed tunnel inspection frequency and recommended revising § 650.511(b)(1) to read: “Provide an up-close or in-depth inspection of the civil/structural elements of the tunnels at regular intervals not to exceed 5 years. Provide an up-close or in-depth inspection of the operational systems at regular intervals of 24 months. It may be beneficial to consider a risk-based approach to provide enhanced safety to the program in an effective manner.”

The VDOT also recommended FHWA consider an incremental implementation of the program to give States an opportunity to plan for the program changes. Additionally, VDOT recommended revising § 650.511(b)(2) until more comprehensive guidelines are developed as follows: “Inspect each tunnel at regular intervals not to exceed 60 months to ensure tunnel structural elements and functional systems are performing as designed, and document the inspection using procedures developed by the owner.”

*The FHWA response:* The FHWA disagrees with the recommendation to allow intervals of 60 months between inspections. The similarities between bridge and tunnel construction materials and associated deterioration mechanisms, design methodologies, and inspection technologies and protocols, along with the long-standing success of a 24-month inspection interval under the NBIS, all support the establishment of a 24-month inspection interval for routine tunnel inspections.

Additionally, the average inspection interval from the 40 responders to the 2003 FHWA survey was approximately 24 months. The majority of commenters, including AASHTO, support the 24-month inspection interval. Additionally, tunnel inspections at this interval will help to proactively identify and address maintenance needs in order to preserve the Federal investment in such key infrastructure. The FHWA believes that 60 months is too long of an interval between inspections to reliably identify and correct safety issues; however, § 650.511(b) has been revised to allow for routine inspection intervals of up to 48 months with FHWA approval. These inspections should be documented according to the procedures detailed in § 650.513. Additionally, MAP-21 requires inspection and inventory of all highway tunnels on public roads. Although no dedicated funding is provided for these inspections, it is an eligible use of funds under several programs established by MAP-21. Consequently, it is the responsibility of the owners to inspect or cause to be inspected all tunnels for which this rule applies.

## **650.513 Inspection Procedures**

This section has been updated to reflect changes in the incorporated reference for the proposed rule, acceptable timeframes for the load rating and posting of a tunnel, the reporting of critical findings, as defined in **23 CFR 650.305**, and how State compliance will be assessed.

A private individual and an anonymous commenter noted that the NTIS should specify the specialized equipment to be used while performing tunnel inspections in order to promote worker safety. The anonymous commenter also recommended the NTIS address worker safety.

*The FHWA response:* The FHWA believes that it is the responsibility of the tunnel Program Manager to determine what specialized equipment would be needed to carry out the tunnel inspection program. Special equipment needs should be documented in the procedures. Additionally, inspector safety procedures should be a part of any tunnel inspection program. Appropriate Federal, State, and local regulations, including OSHA regulations and standards, must be adhered to when conducting tunnel inspections.

Various commenters, including NFPA, PB Americas, and the Seattle Fire Department requested that various publications other than the HRTTIM be referenced in the NTIS. These include referencing the NFPA codes, the AASHTO T-20 Manual, the FHWA TOMIE Manual, and the FHWA 2009 Technical Manual for Design and Construction of Road Tunnels.

*The FHWA Response:* The TOMIE Manual is now proposed to be incorporated by reference in place of the HRTTIM. The FHWA will not be incorporating the FHWA Technical Manual for Design and Construction of Road Tunnels or the AASHTO T-20 Manual by reference; however, tunnel owners are encouraged to use these manuals and the NFPA 502 as part of their inspection programs and these manuals are mentioned as providing guidance for conducting tunnel inspections in § 650.517 of the proposed rule.

The AASHTO and VDOT further recommended that the language of § 650.513(a) be revised to read: “Inspect tunnel structural elements and functional systems in accordance with the inspection guidance provided in the Highway and Rail Transit Tunnel Inspection Manual (incorporated by reference, see § 650.517) for in-depth inspections and in accordance with the procedures developed by the owner for routine, drainage and special inspections.”

*The FHWA Response:* The HRTTIM has been replaced by the TOMIE Manual as the manual to be incorporated by reference. The FHWA believes that the TOMIE Manual provides inspection guidance that can apply to all levels of inspection including in-depth, routine, and special.

The NFPA, the Seattle Fire Department, and AASHTO suggested that the NTIS recommend or list specific systems/elements that should be inspected. These commenters expressed a concern that inspection requirements relative to fire and life safety systems were not properly addressed in the NTIS. The commenters suggested that testing requirements of functional systems be included in the NTIS. The AASHTO further commented that functional system testing requirements should only apply to mechanical/electrical systems.

*The FHWA Response:* The FHWA believes that inspection of fire and life safety systems is a critical aspect of any tunnel inspection program. The inspection requirements for these components are adequately addressed in the TOMIE Manual. Under the proposed rule, the tunnel owner and Program Manager are responsible for developing more specialized inspection procedures that cover the inspection of components unique to a specific tunnel. The FHWA believes that the definition of functional systems as contained in § 650.505 is appropriate, as the components contained within the definition of functional systems for a complex tunnel go well beyond just electrical and mechanical systems and appropriately include ventilation and fire suppression and warning systems, as well as the additional components included in § 650.505.

The FHWA does not believe that the NTIS needs to be overly prescriptive in defining specific inspection requirements for various tunnel elements or components. The NTIS is meant to provide national requirements relative to tunnel inspection and reporting, and allows tunnel owners and inspection program managers the flexibility to develop inspection procedures that fit the needs and complexity of unique tunnels, including system and component testing. Tunnel owners would be encouraged to develop inspection and maintenance manuals for various functional systems as part of the original design, and incorporate those maintenance manuals into the overall tunnel inspection procedures.

The AASHTO commented that the requirement that tunnel-specific inspection procedures be developed for each tunnel inspected and inventoried should not apply to simple rural tunnels.

*The FHWA Response:* While the breadth of required procedures are not defined in the NTIS, FHWA still maintains that no matter how simple a rural tunnel might be, inspection procedures of some kind should be developed.

The ACEC recommended including a statement in the NTIS that inspection reports should be prepared with care and skill. The ACEC also commented that the NTIS should make clear that inspection reports are for the exclusive use of the tunnel owner.

*The FHWA Response:* The FHWA assumes that the inspection reports would be prepared with care and skill. Deficient reports would certainly be noticed and corrected by the Team Leader or Program Manager.

The FHWA understands that dissemination of the information might be a concern of tunnel owners; however, the rule requires that inspection and inventory information be submitted to FHWA to fulfill the proposed requirements of this regulation. Tunnel owner dissemination of reports beyond the required submission to FHWA is outside the scope of this rulemaking.

The AASHTO expressed concern relative to FHWA Division oversight of the NTIS requirements.

*The FHWA Response:* The FHWA is proposing to use a data-driven, risk-based oversight process similar to that associated with the NBIS.

The AASHTO requested that tunnels with at-grade internal roadways and with no overhead roadways should be exempted from the load rating requirement. The AASHTO and VDOT further suggested that § 650.513(g) be revised to read, “Rate each tunnel, which carries live load above and within the influence area of the tunnel roof or lining or carries traffic within the tunnel on a structural system, as to its safe vehicular/non-vehicular load-carrying capacity in accordance with the AASHTO Manual for Bridge Evaluation. Post or restrict the highways in or over the tunnel in accordance with this same manual unless otherwise specified in State law, when the maximum unrestricted legal loads or State permit load exceed that allowed under the operating rating or equivalent rating factor.”

*The FHWA Response:* The FHWA has modified the proposed rule at § 650.513(g) to exempt at-grade roadways within tunnels from the NTIS load rating requirement in response to AASHTO's comment. The FHWA has also added a definition of *at-grade roadway* to § 650.505 of the NTIS. Further explanation is contained in the analysis for § 650.505—Definitions. The FHWA believes the addition of this definition will clarify what structural elements contained within a tunnel are intended to be load rated. Additionally, FHWA does not believe that dropping the word “routine” relative to load posting restrictions is required to clarify the intent of these regulations.

The AASHTO requested that Quality Control/Quality Assurance (QC/QA) requirements be developed in consultation with AASHTO. The VDOT proposed revising subsection (i) to read “Conduct systematic quality assurance of tunnel inspections and ratings in accordance with the owner's quality assurance program. Include periodic field review of inspections and independent review of inspection reports and computations in the owner developed program.”

*The FHWA Response:* The FHWA agrees and will work with AASHTO to develop QC/QA guidelines. The FHWA disagrees with the proposed language from VDOT because it does not specifically address Quality Control.

The AASHTO and VDOT recommended that FHWA develop inventory reporting format guidelines for the NTIS similar to the NBIS Structural Inventory and Appraisal (SI&A) sheets. The AASHTO and VDOT further recommended that § 650.513(h) be revised so that written reports are maintained for in-depth, routine, and special tunnel inspections.

*The FHWA Response:* The FHWA agrees with AASHTO and VDOT concerning developing inventory reporting guidelines. The FHWA-approved reporting formats are included in the NTIS docket and available on the FHWA Web site at [www.fhwa.dot.gov/bridge/tunnel/library.htm](http://www.fhwa.dot.gov/bridge/tunnel/library.htm).

Section 650.513(h) of these regulations would require that written reports on the results of tunnel inspections, together with notations of any action taken to address the findings of such inspections, be maintained. It was intended that this language apply broadly to the types of inspections performed: initial, routine, in-depth, and special inspections.

The AASHTO and VDOT suggested annual reporting of critical findings and corrective actions taken to resolve or monitor the same. They further suggest that a critical finding be considered a system with a general condition rating of “3” or less.

*The FHWA Response:* The FHWA has revised the reporting requirement to ensure that critical findings, as defined in **23 CFR 650.305**, are addressed in a timely manner. The regulation proposes that FHWA be notified within 24 hours of any critical finding and the activities taken, underway or planned to resolve or monitor the critical finding. Additionally, the regulation proposes an annual written report to FHWA with a summary of the current status of the resolutions for each critical finding identified within that year along with any critical findings that remain unresolved from a previous year.

The FHWA believes that the definition of a critical finding would be limited by adding the language proposed by the commenters. While it is generally accepted that a system, element, or component with a condition rating of “3” or less would be in poor condition, condition rating systems can change. Additionally, a system, element, or component with a condition rating of “3” or less might not warrant being classified as a “critical finding.” For example, a sidewalk may have deterioration that would warrant a condition rating of “3” or less, but could adequately be addressed or repaired by the tunnel owner without requiring reporting to FHWA. The intent of this portion of the proposed regulations is to provide a reporting mechanism to FHWA of the most extreme and critical structural, component, or system deteriorations or failures that could be a threat to the traveling public's safety and well-being. Further, this portion of the proposed rule seeks to ensure that severe conditions are addressed in a timely and appropriate manner through oversight and

partnership with FHWA. The FHWA believes that the current wording of this proposed rule adequately fulfills this intent.

The AASHTO and VDOT suggested that FHWA revise § 650.513(f) to require initial, routine, and in-depth tunnel inspections be done with qualified staff not associated with operation or maintenance of the tunnel structure, but that this requirement should not apply to drainage inspections.

*The FHWA Response:* The FHWA agrees that these proposed regulations should not apply to drainage inspections not associated with an initial, routine, in-depth, or special inspection. However, FHWA declines to incorporate this suggested change to subsection (f), which addresses inspection broadly and states that the inspection must be performed by personnel separate and apart from the operation and maintenance of the tunnel. This requirement is intended to provide an outside perspective from an unbiased inspector, but it does not preclude operation and maintenance personnel from contributing to the inspection. Tunnel owners would be required by this rule to develop inspection procedures for all types of inspections that would be implemented by qualified staff.

The AASHTO commented that § 650.513(h) be revised so that the requirements to prepare inspection documentation using the HRTTIM should apply only to in-depth inspections.

*The FHWA Response:* The HRTTIM has been replaced by the TOMIE Manual as the manual incorporated by reference with guidance on inspection documentation. The FHWA believes that the guidance contained in the TOMIE Manual should apply to all levels of inspection and not be limited to just in-depth inspections. The TOMIE Manual provides guidance for documenting inspections that FHWA believes would add consistency and value to asset management efforts.

## **650.515Inventory**

This section has been amended to direct owners and responsible parties to FHWA-approved recording and coding guidance for the purpose of assembling tunnel inventory information.

The NFPA recommended that tunnel inspection records be kept for 10 years or four inspection cycles, whichever is longer. The NFPA further suggested that the rule should establish variable recordkeeping requirements based on the different inspection cycles for different types or groups of tunnels.

*The FHWA Response:* For the benefit of knowing the history of previous rehabilitation and repair works, FHWA believes it is necessary to keep tunnel records for the life of the tunnel, which is consistent with the AASHTO Manual for Bridge Evaluation recommendation for bridge records. This information is typically of high value in preparing inspection plans and maintenance actions.

Tunnel owners would be required to prepare inspection reports as specified in § 650.513(h). Inspection cycle is discussed in § 650.511, Inspection Interval.

The NFPA recommended a unique and meaningful tunnel ID system for each and every tunnel.

*The FHWA Response:* The FHWA agrees that each tunnel needs a unique ID and will provide guidance on how to generate these unique IDs similarly to how owners generate the unique IDs assigned to bridges under the NBIS.

The ASCE expressed support for the requirement that each Federal agency or State complete an inventory of tunnels in their jurisdictions within 30 days of the adoption of a final rule. The VDOT recommended that FHWA change the target for submission of the preliminary inventory from 30 days to within 90 days of the effective date of the rule. Caltrans indicated that it is unrealistic to expect that all tunnels will be inventoried and the results reported to FHWA within 30 days of the effective date of the rule.

*The FHWA Response:* The FHWA understands the concern with completing the preliminary tunnel inventory within 30 days of the effective date of this rule and has changed the reporting requirement from 30 days to 120 days in § 650.515(a).

The VDOT recommended that State DOTs should have the option of using data from their existing inspection procedures to rate the structural and functional conditions in their tunnels, converting the data from their existing condition rating system to the NTIS format, and submitting the data to FHWA within 120 days of the effective date of this rule instead of using the HRTTIM chart.

*The FHWA Response:* For the purpose of the preliminary data submission, FHWA agrees that existing data can be used if submitted in the proper format. However, to ensure a uniform approach and criteria are used to inspect all tunnels subject to this rule, FHWA is proposing not to allow previous inspection data to be used for the NTIS initial routine inspection.

The ASCE recommended including information on portals, geometric ground conditions, lane clearances, and other geodata, and a complete description of the mechanical systems in the inventory.

Caltrans also suggested FHWA develop a tunnel inventory system to be compatible with existing National Bridge Inspection (NBI) coding framework. The MassDOT strongly recommended that FHWA develop a standard reporting format with standard coding conventions and codes for reporting tunnel inventory data, in the same manner as the SI&A sheet functions for bridges, before requiring the submission of the preliminary inventory. The MassDOT noted that a tunnel may be divided into segments due to its length and many segments may not have a portal feature. The MassDOT recommended that FHWA take into account such a segmentation of tunnels for inventory, inspection, and maintenance purposes.



*The FHWA Response:* The FHWA would develop and provide guidance for a tunnel inventory system consistent with the NBI format which would permit segmenting of a tunnel at the discretion of the owner.

The Seattle Fire Department recommended collecting comprehensive data for fire and life safety systems at the time of installation or in the planned inspections in the first 12 months, and collecting a separate set of information regarding “design assumptions” or the basis of design. The Seattle Fire Department proposed adding a new paragraph under § 650.515(a) to address “Fire and Life Safety Systems and Basis of Design.” Information collected under this proposal would include component level inventory of fire and life safety systems, such as fire detection, notification, fire suppression, ventilation, exiting, and systems that are electronically controlled or monitored by the fire and life safety system. In addition, the Seattle Fire Department proposed collecting information about the assumptions made during initial design and subsequent modifications to fire and life safety systems, including the fire size, fire growth rate, smoke propagation, and evacuation time.

*The FHWA Response:* Section 650.513(c) would require that design assumptions are considered when establishing tunnel-specific inspection procedures. Therefore, as information on the design of the functional systems is needed to meet the requirements of this section, FHWA does not believe it is necessary to add “Fire and Life Safety Systems and Basis for Design” to § 650.515(a).

The AASHTO recommended that FHWA establish a data format in consultation with AASHTO. The AASHTO suggested this format should be similar to the national bridge SI&A geometric data so that the two inventories can be seamlessly integrated. The AASHTO also suggested that the tunnel owner rate the structural and functional system in its tunnels from 0 to 9 in accordance with the HRT™TIM, or convert the data from their existing condition rating system to the NTIS format and submit the data to FHWA within 3 years of the effective date of this rule.

*The FHWA Response:* The FHWA understands AASHTO's concerns but proposes to require that all tunnels be inspected and rated according to the TOMIE Manual until other guidelines become available. The tunnel owners would need to submit a preliminary tunnel inventory within 120 days and perform an initial routine inspection of each tunnel within 24 months of the effective date of this rule or prior to the tunnel opening to traffic as specified in § 650.511(a)(1). To avoid any duplicated efforts, FHWA deleted § 650.515(b), Preliminary assessment of tunnel condition. The information must be reported to FHWA using approved forms included in the NTIS docket and available on the FHWA Web site at [www.fhwa.dot.gov/bridge/tunnel/library.htm](http://www.fhwa.dot.gov/bridge/tunnel/library.htm).

## **650.517 Incorporation by Reference**

The VDOT and AASHTO recommended that the HRT™TIM be updated and revised to be more reflective of the tunnel types, functional systems, and environments that are typically found in highway tunnels, if it is to serve the same function under these regulations as the Bridge Inspection

Reference Manual does under the NBIS. The VDOT also recommended that FHWA revise the rule to remove any reference to specific editions.

Numerous commenters noted that the HRTTIM needs to be updated to better address inspection of electrical and mechanical components and should be revised to include an element level rating system. PB Americas commented that the current HRTTIM is inadequate and so should not be included. Instead, PB Americas suggested using the 2009 FHWA Technical Manual for Design and Construction of Road Tunnels—Civil Elements, (FHWA Tunnel Manual) and the AASHTO Technical Manual for Design and Construction of Road Tunnels—Civil Elements, First Edition (AASHTO Tunnel Manual). The NFPA recommended that the rule reference *NFPA 502: Standard for Road Tunnels, Bridges, and Other Limited Access Highways* (2008 edition).

*The FHWA response:* The FHWA acknowledges that various commenters have suggested updating the HRTTIM. The FHWA agrees and is now proposing to incorporate by reference the TOMIE manual. The FHWA will not be incorporating the FHWA or AASHTO Tunnel Manuals by reference since the main focus of these manuals is design and construction of road tunnels; however, tunnel owners are encouraged to use these manuals, and the *NFPA 502: Standard for Road Tunnels, Bridges, and Other Limited Access Highways* (2008 edition) as part of their inspection programs. A new section, 650.519 Additional materials, has been created to reference these recommended documents and to differentiate them from the material incorporated by reference in the regulatory text.

## Comments on Notice of New Information Collection

The FHWA issued a Notice and Request for Comments on June 14, 2010, ([75 FR 33659](#)) to solicit public comments regarding FHWA's request for the Office of Management and Budget's (OMB) approval of new information collection. The FHWA reviewed and analyzed the comments received in response to the Request for Comments. The FHWA received comments on the docket from 4 commenters, including: 3 State DOTs (New York DOT (NYSDOT), Ohio DOT (ODOT), and VDOT) and 1 organization (AASHTO).

### I. *Estimate of Burden:*

The VDOT, ODOT, and AASHTO commented that the 8 hour burden estimate is low.

The ODOT and AASHTO commented that despite the fact that States are already inspecting their tunnels, the burden on States may still be high because States use different formats that may not be easily adapted to the national standard. The ODOT and AASHTO noted that the estimate of effort must also include: an initial effort of at least 1 year to set up systems to collect and store required data, time for training, and increased time for collecting data. They noted that only simple tunnels are likely to require only 8 hours.

The VDOT, ODOT, and AASHTO commented that the Request for Comment doesn't give details of the data items that will be required. They noted that without more detail, it is impossible to evaluate the time required for collection, management, and reporting.

The VDOT and AASHTO commented that they cannot adequately assess the level of effort because the Request for Comments did not provide details regarding data storage, data formatting, or data submittal.

*The FHWA Response:* The FHWA understands the ODOT, VDOT and AASHTO concerns about the burden to collect and report data. There are two data collection burdens in the proposed rule: preliminary inventory data and tunnel inspection data from either an initial or subsequent routine inspection. The Request for Comments published in 2010 only requested comments on the collection of the preliminary inventory data. The estimate has now been expanded to encompass reporting of subsequent inspection data as required by MAP-21. The FHWA specifically requests comments on the revised information collection included in this proposed rule.

Since many States are already inspecting their tunnels, they are likely to have much of the data needed to satisfy the preliminary inventory data collection burden. Likewise, since many States are already collecting and storing inspection data they are likely to already have much of the data needed to satisfy the inspection burden. As a result, FHWA expects that the additional burden on the States to report this data, possibly in an altered format, will be very minimal. However, to allow States more time to set up systems to collect and store data in the required format and to decrease the burden associated with the collection of initial inspection data, FHWA is increasing the timeframe for initial inspection from 12 to 24 months in the proposed rule and eliminating the requirement to provide preliminary condition data.

The Request for Comment ([75 FR 33659](#)) listed the preliminary inventory data that FHWA proposes to collect to establish the National Tunnel Inventory (NTI). The proposed tunnel inspection data is detailed in the Specifications for National Tunnel Inventory. Both the proposed preliminary inventory data form and the Specifications for the National Tunnel Inventory are available for review at: [www.fhwa.dot.gov/bridge/tunnel/library.htm](http://www.fhwa.dot.gov/bridge/tunnel/library.htm).

It is the intent of FHWA to provide guidance on data formatting and data submittal prior to the implementation of the proposed rule. States will have the individual discretion to decide on the data storage solutions that best fit their program.

Finally, FHWA specifically requests that tunnel owners provide estimates of time to collect and report the inventory and inspection data in their comments so that a more detailed analysis can be made of the burden on States.

The AASHTO commented that data on interior tunnel structural features is not commonly stored in a readily available format and will be especially difficult to collect for older tunnels.

*The FHWA Response:* The FHWA maintains that 120 days is a reasonable period of time for the collection and submission of preliminary tunnel inventory data including data on the interior tunnel structural features. However, for older tunnels where data on interior tunnel structural features is not readily available or difficult to collect, States are encouraged to begin identifying that data in order to ease the burden of responding to the preliminary inventory data submission requirement within the specified time frame.

## II. *Technical comments:*

The VDOT, ODOT, and AASHTO commented that the NTIS should specify data flat file format and provide an “edit/update” computer application similar to the NBIS.

The VDOT, ODOT, and AASHTO noted that the FHWA should prepare the tools to store and submit data before implementing data collection.

*The FHWA Response:* The FHWA is developing a data file format to be used for NTI data submissions. Data quality checks similar to those conducted on NBI submittal data files will be developed to ensure data quality. It is the intent of FHWA to provide guidance on preliminary inventory data submittals prior to the implementation of the proposed rule. The FHWA will also provide guidance to the States on how to appropriately submit routine data before these submittals are due.

States will have the individual discretion to decide on the data storage solutions that best fit their program.

The VDOT recommends that FHWA develop a template using forms or spreadsheets that can be easily populated for responses in order to minimize the burden on States. The VDOT recommends that the template be created in an easy format for State-by-State review and comparison.

*The FHWA Response:* The FHWA plans to use the Preliminary Tunnel Inventory Data Form (included in the NTIS docket and available on FHWA Web site at [www.fhwa.dot.gov/bridge/tunnel/library.htm](http://www.fhwa.dot.gov/bridge/tunnel/library.htm)) to collect the required preliminary inventory data. The Specifications for the National Tunnel Inventory provide more details about and guidelines for formatting, collecting and reporting inventory data to FHWA.

The FHWA is developing a data file format to be used for NTI data submissions. Individual State data submissions could be used for State-by-State reviews and comparisons.

## III. *Use of “OneDOT” for reporting:*

The ODOT and the AASHTO commented that “OneDOT” is not designed to record inventory style data. They suggest including the data in a comment field or, preferably, constructing a table within “OneDOT.”

*The FHWA Response:* The proposed rule does not require tunnel owners to use any existing software or method to record inventory data. The FHWA is developing the Specifications for the National Tunnel Inventory (NTI) and the software tools needed to submit and store data as required by the proposed rule. It is the intent of FHWA to make those tools available prior to the implementation of the proposed rule.

#### *IV. Information to include in the inventory:*

The VDOT and NYSDOT proposed that the inventory include information on tunnel systems, such as tunnel ventilation and fire suppression.

The VDOT proposed that the inventory include information about emergency response, including fire response times, the responsible agency for providing fire response, and whether the tunnel facility is regulated or unregulated for hazardous materials.

The VDOT suggested that the inventory include a list of points of contact for State tunnel facilities in order to facilitate interaction among the States.

*The FHWA Response:* The Specifications for the National Tunnel Inventory detail the type of data to be collected on ventilation and fire suppression systems as well as whether a tunnel is regulated or unregulated for hazardous material. However, FHWA does not feel it is necessary to include data on emergency response, including fire response times, the responsible agency for providing fire response, and a list of points of contact for State tunnel facilities in the NTI. The FHWA believes that the suggested data is very important to the operation of the facility and should be readily accessible by the State from their records, but is not needed at the national level.

#### *V. Numbering System/ "Portal Milepost":*

The VDOT and AASHTO commented that the "Portal Milepost" is not a common locator for all agencies. The AASHTO suggested that FHWA allow States to substitute a Bridge Management System Number or other common locating system for the Portal Milepost.

The VDOT, ODOT, and AASHTO suggested the use of a national numbering system.

*The FHWA Response:* The FHWA appreciates the comment. The proposed rule no longer requires the reporting of "Portal Milepost" data as part of the basic tunnel information to be collected. The Specifications for the NTI will require that the linear referencing system (LRS) as defined by the State for the Highway Performance Monitoring System, be used to identify the location of each tunnel on their highway network.

The FHWA does believe that each tunnel will need a unique ID. However, in lieu of a national numbering system, FHWA will provide guidance on how to generate these unique IDs similarly to how owners generate the unique IDs assigned to bridges under the NBIS.

## VI. *Definition of "Tunnel":*

The NYSDOT recommended that the rule provide a clear definition of "tunnel" and "bore." The NYSDOT noted that cut-and-cover tunnels should be included in the inventory, but that use of the term "bore" could eliminate them.

The NYSDOT commented that many structures that could be inventoried as tunnels are already classified as bridges in the NBIS. The NYSDOT recommended that the NTIS should not supersede these NBIS bridges.

The NYSDOT commented that the rule needs to define the maximum distance between bores of the same tunnel. The NYSDOT recommended that bores with distance greater than the maximum be inventoried as separate tunnels.

*The FHWA Response:* The proposed rule defines a "tunnel" in section 650.505 as an enclosed roadway for motor vehicle traffic with vehicle access limited to portals, regardless of type of structure or method of construction. Cut-and-cover refers to a method of construction for a tunnel. Therefore, tunnels constructed with the cut-and-cover method that meet all the other criteria of the tunnel definition would be subject to the requirements of the proposed rule.

The proposed rule states that a structure shall be inspected and inventoried under either the NBIS or the NTIS, but not both. The proposed rule allows owners to determine if a structure in their inventory is a tunnel or a bridge based on the guidance included in the NBIS and the NTIS.

The term "bore," which is generally associated with a type of tunnel construction, is also used to identify the individual roadway enclosures of a tunnel. The FHWA does not believe it is necessary to establish a maximum distance between bores of a tunnel for inventory purposes. Inventorying individual bores of a tunnel as separate tunnels is being left to the discretion of the owner.

## VII. *Responsibility for inspection and reporting:*

The ODOT and AASHTO recommended that the rule provide clear guidelines on inspection responsibility, particularly for State DOTs and for tunnels owned by Federal agencies. The AASHTO questioned whether the inventory is limited to only highway tunnels, or whether it includes railroad and pedestrian walkway tunnels as well.

The NYSDOT commented that it doesn't own any tunnels in the State and will have to rely on tunnel owners for information to report to FHWA.

*The FHWA Response:* The proposed rule will apply to all structures defined as highway tunnels on all public roads, on and off Federal-aid highways, including tribally and federally owned tunnels. Under title 23, the FHWA's primary relationship in a State is with the State DOT. Therefore, the State DOT would be legally responsible for fulfilling the requirements of these proposed regulations

within its State's boundaries. If current legal authority is not present within a State to carry out this responsibility, the State DOT should seek that authority. As a result of this proposed rule, State DOTs would be responsible for the implementation of the proposed rule on all applicable tunnels within their States with the exception of tribally and federally owned tunnels as discussed in the section-by-section analysis for § 650.505.

The proposed rule does not apply to tunnels exclusively used by railroads or pedestrians.

#### VIII. *Define “Preliminary Condition Data”:*

The NYSDOT and AASHTO commented that the standards need to define “preliminary condition data” in order to correctly determine the level of effort needed to collect and submit the data.

*The FHWA Response:* The proposed rule no longer requires “preliminary condition data” be collected or submitted. The proposed rule would require that all tunnels be inspected according to the TOMIE Manual until other guidelines become available. The collection and submission of condition data is expected as a part of these inspections. Tunnel owners will still need to submit preliminary inventory data within 120 days of the effective date of this rule. To avoid any duplicated efforts, FHWA deleted § 650.515(b) from the proposed rule which required the submission of data indicating a preliminary assessment of tunnel condition.

#### IX. *General Comments:*

The AASHTO recommended that FHWA not be too prescriptive on the information it wants and that it allow some flexibility.

*The FHWA Response:* The FHWA appreciates the comment. The proposed rule will require that all tunnels be inspected according to the TOMIE Manual and the Specifications for the National Tunnel Inventory. These guidelines will ensure that the data received from across the country is adequately consistent to identify national trends in performance and demonstrate the linkages between Federal transportation expenditures and transportation agency programmatic results.

The AASHTO commented that the NCHRP Report titled “Best Practices for Implementing Quality Control and Quality Assurance for Tunnel Inspection” would be helpful in the development of the national inspection program for tunnels.

*The FHWA Response:* The FHWA appreciates and agrees with the comment that the NCHRP Report titled “Best Practices for Implementing Quality Control and Quality Assurance for Tunnel Inspection” would be helpful in the development of the national inspection program for tunnels. This document was considered during the development of the proposed rule.

## **Executive Order 12866 (Regulatory Planning and Review), Executive Order 13563 (Improving Regulation and Regulatory Review), and DOT Regulatory Policies and Procedures**

The FHWA has determined that this proposed rule constitutes a significant regulatory action within the meaning of Executive Order 12866 and is significant within the meaning of the DOT regulatory policies and procedures. This action complies with Executive Orders 12866 and 13563 to improve regulation. This action is considered significant because of widespread public interest in the safety of highway tunnels, although not economically significant within the meaning of Executive Order 12866.

### **Current Cost of Tunnel Inspections**

Having received relatively few comments at the ANPRM stage regarding costs and mindful of the potential cost implications of the proposed rule, in the NPRM, FHWA renewed its specific request for information regarding estimated or actual costs associated with tunnel inspections, particularly the typical inspection costs per linear foot of tunnel. In addition, the FHWA requested comments regarding the anticipated increased costs the proposed NTIS would impose on tunnel owners. Only WSDOT commented on the cost of tunnel inspections in response to the NPRM. The WSDOT stated that the budget for the recently completed mechanical and electrical in-depth inspection of the MLK Lid and Mount Baker Ridge Tunnel was \$409,500 for the consultants alone. The WSDOT was in the process of negotiating a scope of work and cost estimate for a similar inspection in the spring for the Mercer Island Tunnel and the Convention Center, which was expected to be of similar magnitude. While FHWA appreciates WSDOT providing such information, it is unclear from the information received what the scope of the work and inspection for this particular tunnel would be. Without further information on the length of the tunnel, the complexity of the design, and the number and type of functional systems, it is difficult to determine if the numbers provided by WSDOT fall within the anticipated cost range FHWA has outlined below. As a result of this lack of information and the broadened scope of the proposed rule, FHWA renews its request for estimated or actual costs associated with tunnel inspections, particularly the typical inspection costs per linear foot of tunnel. In addition, FHWA specifically requests information on the following: (1) The average number of critical findings that are identified during inspections, (2) the average cost of fixing critical findings that are identified during inspections, (3) cost savings associated with the repair of critical findings, (4) costs (administrative, economic, and any other) associated with closing tunnels, roads, etc. in order to conduct inspections according to the provisions in this rulemaking, and (5) any other data the public believes would be helpful in determining the costs and benefits associated with addressing critical findings.



The FHWA's 2003 tunnel inventory survey indicates that there are approximately 45 organizations that own, operate, and/or maintain approximately 350 vehicular (highway) tunnels (bores) in the United States. These tunnels represent nearly 100 miles—running the distance of approximately 517,000 linear feet—of Interstates, State routes, and local routes. Tunnel inspection costs can vary greatly from tunnel to tunnel. Comments to the ANPRM and NPRM suggested that current inspection costs range from \$5 to \$75 per linear foot per inspection depending on the complexity of the tunnel. If we assume that each highway tunnel includes four lanes, FHWA estimates that the total current inspection cost for all tunnel owners could range between \$10,340,000 (4 lanes x 517,000 x \$5) and \$155,100,000 (4 lanes x 517,000 x \$75). This results in a current estimated average cost range between \$29,542 (\$10,340,000/350) and \$443,142 (\$155,100,000/350) per tunnel bore, per inspection. These figures reflect current costs to inspect and do not include the additional costs anticipated to be associated with this rulemaking.

## Costs Effects of the NTIS

Based on data from the 2003 survey, and subsequent communications the agency had with two tunnel owners, only 2 tunnel owners (the Metropolitan Transportation Authority in New York and the VDOT), that together own 15 tunnel bores, would be required to increase their current inspection frequency as a result of the interval for inspection required by this action.<sup>[13]</sup> These 2 tunnel owners have inspection intervals that are longer than the proposed 24 months, and based on FHWA's tunnel inspection cost estimate range would experience an increase in costs due to more frequent tunnel inspections. Using the estimated inspection cost range for a single tunnel bore arrived at above (\$29,542 to \$443,142), we can estimate the total aggregate cost increase for the two tunnel owners not currently inspecting at the required interval.

Owner A currently inspects at a 10-year interval and owns four tunnel bores. We estimate the current annual inspection costs for Owner A to be between \$2,954.2 (\$29,542/10) and \$44,314.2 (\$443,142/10) per tunnel bore. Under the proposed rule, we estimate the annual inspection costs for Owner A to be between \$14,771 (\$29,542/2) and \$221,571 (\$443,142/2) per tunnel bore. As a result, Owner A would see an estimated annual cost increase of between \$11,817 (\$14,771 – \$2,954.2) and \$177,257 (\$221,571 – \$44,314.2) per tunnel bore. For all four tunnel bores owned by Owner A, we estimate the current annual inspection costs to be between \$11,817 (4 x \$2,954.2) and \$177,257 (4 x \$44,314.2). Under the proposed rule, we estimate the annual inspection costs for all four tunnel bores to be between \$59,084 (4 x \$14,771) and \$886,284 (4 x \$221,571). As a result, Owner A would see an estimated total cost increase of between \$47,267 (\$59,084 – \$11,817) and \$709,027 (\$886,284 – \$177,257).

Owner B currently inspects at a 7-year interval and owns 11 tunnel bores. We estimate the current annual inspection costs for Owner B to be between \$4,220.3 (\$29,542/7) and \$63,306 (\$443,142/7) per tunnel bore. Under the proposed rule, we estimate the annual inspection costs for Owner B to be between \$14,771 (\$29,542/2) and \$221,571 (\$443,142/2) per tunnel bore. As a result, Owner B

would see an estimated annual cost increase of between \$10,551 (\$14,771 – \$4,220) and \$158,265 (\$221,571 – \$63,306) per tunnel bore. For all 11 tunnel bores owned by Owner B, we estimate the current annual inspection costs to be between \$46,423 (11 x \$4,220.3) and \$696,366 (11 x \$63,306). Under the proposed rule, we estimate the annual inspection costs for all 11 tunnel bores to be between \$162,481 (11 x \$14,771) and \$2,437,281 (11 x \$221,571). As a result, Owner B would see an estimated total cost increase of between \$116,058 (\$162,481 – \$46,420) and \$1,740,915 (\$2,437,281 – \$696,366).

Based on the above analysis, FHWA estimates the current aggregate annual cost of tunnel inspections for the two affected tunnel owners to be between \$58,240 (\$11,817 + \$46,423) and \$873,623 (\$177,257 + \$696,366). Under the inspection interval that would be required by the proposed rule, we estimate the aggregate annual cost to be between \$221,565 (59,084 + \$162,481) and \$3,323,565 (\$886,284 + \$2,437,281). As a result, FHWA estimates the aggregate annual cost increase for the inspections for the two affected tunnel owners to range between \$163,325 (low) (\$221,565 – \$58,240) and \$2,449,942 (high) (\$3,323,565 – \$873,623). The FHWA notes that each tunnel owner must collect and submit inventory data information for all tunnels subject to this proposed rule within 120 days of the effective date and when requested by FHWA in the future. The total estimated cost to collect, manage, and report preliminary inventory data is \$56,160 (2,808 hours @ \$20/hour = \$56,160). As a result, FHWA estimates the total aggregate annual cost increase for the inspections for the two affected tunnel owners to range between \$219,485 (low) (\$163,325 + \$56,160) and \$2,506,102 (high) (\$2,449,942 + \$56,160).

The FHWA expects that the overall increase in costs of inspecting tunnels would be modest, as the vast majority of tunnel owners already inspect at the 24-month interval proposed by the NTIS. However, FHWA does not have sufficient information regarding the cost increase from the rest of the provisions of the rulemaking such as fixing critical defects and closing tunnels and roads in order to conduct the inspections. The FHWA recognizes that the 2003 tunnel inventory survey does not represent the full universe of tunnel owners and tunnels, but believes that it is comprehensive enough to draw preliminary conclusions on the cost effects of this proposed rule. The FHWA also assumes that any increase in the cost per inspection resulting from the rule's requirements would not cause the cost per inspection to exceed the upper end of the range of inspection costs assumed in the analysis. The FHWA requests tunnel owners to submit comments on the accuracy and reasonableness of FHWA's tunnel inventory and inspection cost assumptions (above).

In addition to the costs associated with more frequent inspections, FHWA expects that tunnel owners may experience a modest increase in costs as a result of the training requirements contained in the proposed rule. Based on the training of bridge inspectors under the NBIS, we estimate that the cost to train a tunnel inspector will be approximately \$3,000 over a 10-year period (1 basic class and 2 refresher classes).

The above estimated tunnel inspection costs were compiled based on the limited cost data submitted by tunnel owners in response to the NPRM. The FHWA requests that States, Federal agencies, and others submit their most current inspection costs per each tunnel in their inventory which will help the agency prepare a more comprehensive cost estimate of tunnel inspections. In addition, FHWA requests that tunnel owners submit information on the costs associated with training tunnel inspectors and the costs associated with the repair of critical defects identified during inspections (including user costs resulting from lane closures during the repair period). The FHWA also requests information on how frequently currently conducted inspections identify significant safety defects in tunnels that require repairs and what costs appear to have been prevented as a result of identifying the defect during an inspection rather than as a result of a failure.

## Benefits Resulting From the NTIS

Timely tunnel inspection could uncover safety problems. The agency is taking this action to respond to the statutory directive in MAP-21 and because it believes that ensuring timely and reliable inspections of highway tunnels will result in substantial benefits by enhancing the safety of the traveling public and protecting investments in key infrastructure. In addition, we believe that any repairs or changes that take place because of problems identified in the inspections could lead to substantial economic savings.

Additionally, the proposed NTIS could protect investments in key infrastructure, as early detection of problems in tunnels could increase the longevity of these assets and avoid more costly rehabilitation and repair actions over time. It is generally accepted in the transportation structures community that inspection and maintenance are effective forms of avoiding substantial future costs. For example, a 2005 University of Minnesota study on the benefits of asphalt runway maintenance concluded that, at a minimum, the costs of maintaining a runway were half those of not maintaining a runway when measured over the life of the asset.<sup>[14]</sup> However, the study's conclusions only considered the direct costs of maintenance and construction and not the indirect costs associated with the mobility of the traveling public, goods and services and freight. As tunnels provide mobility, which is vital to local, regional, and national economies, and to our national defense, it is imperative that these facilities are properly inspected and maintained to avoid both the direct costs associated with rehabilitation and the indirect costs to users.

The above description of tunnel inspection benefits were summarized from the limited benefit data submitted by tunnel owners in response to the NPRM and compiled by FHWA. The FHWA requests that States, Federal agencies, and others submit any additional benefit data that will help the agency prepare a more comprehensive analysis of the benefits associated with tunnel inspections. The FHWA specifically requests data on the cost savings associated with the repair of critical defects identified during inspections.

## Summary

As established above, FHWA does not have sufficient information to estimate total costs and total benefits of this rulemaking. The Agency has preliminary estimates regarding just the inspection portion of the rulemaking and believes them to be between \$219,485 (low) and \$2,506,102 (high). The FHWA seeks information regarding the full costs and benefits of this rulemaking.

## Regulatory Flexibility Act

In compliance with the Regulatory Flexibility Act (96, 5 U.S.C. 601-612), FHWA has evaluated the effects of this SNPRM on small entities and anticipates that this action will not have a significant economic impact on a substantial number of small entities. Because the regulations are primarily intended for States and Federal agencies, FHWA has determined that the action will not have a significant economic impact on a substantial number of small entities. States and Federal agencies are not included in the definition of small entity set forth in 5 U.S.C. 601. Therefore, the Regulatory Flexibility Act does not apply, and FHWA certifies that the action will not have a significant economic impact on a substantial number of small entities.

## Unfunded Mandates Reform Act of 1995

The FHWA has determined that this SNPRM will not impose unfunded mandates as defined by the Unfunded Mandates Reform Act of 1995 (Pub. L. 104-4, March 22, 1995, 109 Stat. 48). The NTIS is needed to ensure safety for the users of the Nation's tunnels and to help protect Federal infrastructure investment. As discussed above, FHWA finds that this regulatory action will not result in the expenditure by State, local, and tribal governments, in the aggregate, or by the private sector, of \$143,100,000 or more in any one year (2 U.S.C. 1532). Additionally, the definition of “Federal mandate” in the Unfunded Mandates Reform Act excludes financial assistance of the type in which State, local, or tribal governments have authority to adjust their participation in the program in accordance with changes made in the program by the Federal Government. The Federal-aid highway program permits this type of flexibility.

## Executive Order 13132 (Federalism Assessment)

The FHWA has analyzed this SNPRM in accordance with the principles and criteria contained in Executive Order 13132. The FHWA has determined that this action will not have sufficient federalism implications to warrant the preparation of a federalism assessment. The FHWA has also determined that this action will not preempt any State law or State regulation or affect the States' ability to discharge traditional State governmental functions.

## Executive Order 12372 (Intergovernmental Review)

The regulations implementing Executive Order 12372 regarding intergovernmental consultation on Federal programs and activities apply to this program. Local entities should refer to the Catalog of Federal Domestic Assistance Program Number 20.205, Highway Planning and Construction, for further information.

## Paperwork Reduction Act

Under the Paperwork Reduction Act of 1995 (PRA) (44 U.S.C. 3501 *et seq.*), Federal agencies must obtain approval from OMB for each collection of information they conduct, sponsor, or require through regulations. This action contains a collection of information requirement under the PRA. The MAP-21 requires the Secretary to inventory all tunnels on public roads, on and off Federal-aid highways, including tribally owned and federally owned tunnels. In addition, each State, Federal agency, and tribal government is required to report to the Secretary on: the results of tunnel inspections and notations of any action taken pursuant to the findings of the inspections, and current inventory data for all highway tunnels reflecting the findings of the most recent tunnel inspection conducted. In order to be responsive to the requirements of MAP-21, FHWA proposes to collect data to establish a NTI and to require the submission of data on the results of tunnel inspections. A description of the collection requirements, the respondents, and an estimate of the estimated annual reporting burden are set forth below:

## National Tunnel Inventory Collection

The FHWA proposes to collect data to establish an NTI. Initially a subset of the Inventory Items defined in the Specifications of the National Tunnel Inventory will be collected. This information will be reported to FHWA on the Preliminary Tunnel Inventory Data Form which is included in the NTIS docket and available on the FHWA Web site at: [www.fhwa.dot.gov/bridge/tunnel/library.htm](http://www.fhwa.dot.gov/bridge/tunnel/library.htm).

The following is the data that will be collected under the NTI on the Preliminary Tunnel Inventory Data Form:

- (1) Identification Items: tunnel number, tunnel name, State code, county code, place code, highway agency district, route number, route direction, route type, facility carried, LRS route ID, LRS mile point, tunnel portal's latitude, tunnel portal's longitude, border tunnel State or county code, border tunnel financial responsibility, border tunnel number and border tunnel inspection responsibility.
- (2) Age and Service Items: year built, year rehabilitated, total number of lanes, average daily traffic, average daily truck traffic, year of average daily traffic, detour length and service in tunnel.
- (3) Classification Items: owner, operator, direction of traffic, toll, NHS designation, STRAHNET designation and functional classification.

(4) Geometric Data Items: tunnel length, minimum clearance over tunnel roadway, roadway curb-to-curb width, and left curb and right curb widths.

(5) Structure Type and Material Items: number of bores, tunnel shape, portal shape, ground conditions and complexity.

The anticipated respondents include the 50 States, the District of Columbia, Puerto Rico, and any Federal agencies and tribal governments that own tunnels. The estimated burden on the States to collect, manage, and report this data is assumed to be 8 hours per tunnel for a total estimate of 2,808 hours for all 350 estimated tunnels in the Nation. This represents an average of 54 hours per responder. With the average time of 54 hours per responder to collect, manage and report preliminary inventory data, it is estimated that the burden hours will total 2,808 hours per year (52 responses x 54.00 hours per responder = 2,808 hours).

## Annual Inspection Reporting

In addition to the preliminary inventory information described above, tunnel owners are required to report to the Secretary on the results of tunnel inspections and notations of any action taken pursuant to the findings of the inspections. For all inspections, tunnel owners would be required to enter the appropriate inspection data into the State DOT, Federal agency, or tribal government inventory within 3 months from the completion of the inspection. The number of responses per year is based on the total number of tunnels in the United States of 350, with approximately one half being inspected each year based on the standard 24 month inspection frequency. The annual responses are estimated at 175 for routine inspections. With the average time of 40 hours to collect, manage and report routine inspection data, and an additional 2,080 hours to follow up on critical findings, it is estimated that the burden hours will total 9,080 hours per year (7,000 hours (175 responses x 40.00 hours per response) + 2,080 hours (for follow-up on critical findings) = 9,080 burden hours).

## Estimated Total Annual Burden Hours

The FHWA estimates that the collection of information contained in this proposed rule would result in approximately 11,888 total annual burden hours (2,808 hours for preliminary inventory collection + 9,080 for annual inspections = approximately 11,888 total annual burden hours). Since the majority of States are already inspecting their tunnels, they are likely to have much of the data needed to satisfy the preliminary inventory data collection burden. Likewise, since many States are already collecting and storing inspection data they are likely to already have much of the data needed to satisfy the routine inspection burden. As a result, FHWA expects that the additional burden on the States to report this data will be very minimal.

A notice seeking public comments on the collection of information included in this proposed rule was published in the Federal Register on June 14, 2010 at 75 FR 33659. The FHWA received comments from 4 commenters, including 1 organization (AASHTO) and 3 State DOTs (New York, Oregon, and Virginia). These comments have been addressed above.

The Department again invites interested persons to submit comments on any aspect of the information collection, including the following: (1) Whether the proposed collection of information is necessary for the DOT's performance, including whether the information will have practical utility; (2) the accuracy of the DOT's estimate of the burden of the proposed information collection; (3) ways to enhance the quality, usefulness, and clarity of the collected information; and (4) ways that the burden could be minimized, including the use of electronic technology, without reducing the quality of the collected information. Comments submitted in response to this notice will be summarized or included, or both, in the request for OMB approval of this information collection.

## **National Environmental Policy Act**

The Department has analyzed this action for the purpose of the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321 et seq.), and has determined that this action would not have a significant effect on the quality of the environment and qualifies for the categorical exclusion at 23 CFR 771.117(c)(20).

## **Executive Order 12630 (Taking of Private Property)**

This action will not affect a taking of private property or otherwise have taking implications under Executive Order 12630, Governmental Actions and Interference With Constitutionally Protected Property Rights.

## **Executive Order 12988 (Civil Justice Reform)**

This action meets applicable standards in section 3(a) and 3(b)(2) of Executive Order 12988, Civil Justice Reform, to minimize litigation, eliminate ambiguity, and reduce burden.

## **Executive Order 13045 (Protection of Children)**

The FHWA has analyzed this action under Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks. This proposed rule does not concern an environmental risk to health or safety that may disproportionately affect children.

## **Executive Order 13175 (Tribal Consultation)**

The FHWA has conducted a preliminary analysis of this proposed action under Executive Order 13175, dated November 6, 2000. The FHWA believes that this proposed rule will not have substantial direct effects on one or more Indian Tribes, will not impose substantial direct compliance costs on Indian tribal governments, and will not preempt tribal law. To FHWA's knowledge, there are no tunnels that are owned, operated, or maintained by Indian tribal governments. However, FHWA requests comments from Indian tribal governments and others regarding any potential impacts that this SNPRM may have on Indian Tribes. The FHWA specifically requests information on the number of tunnels owned or operated by Indian tribal governments. This information will allow the agency to conduct a more thorough analysis of the possible effect of this SNPRM on Indian Tribes.

## **Executive Order 13211 (Energy Effects)**

The FHWA has analyzed this proposed rule under Executive Order 13211, Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use. We have determined that the rule will not constitute a significant energy action under that order because, although it is considered a significant regulatory action under Executive Order 12866, it is not likely to have a significant adverse effect on the supply, distribution, or use of energy.

## **Executive Order 12898 (Environmental Justice)**

Executive Order 12898 requires that each Federal agency make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minorities and low-income populations. The FHWA has determined that this rule does not raise any environmental justice issues.

## **Regulation Identification Number**

A regulation identification number (RIN) is assigned to each regulatory action listed in the Unified Agenda of Federal Regulations. The Regulatory Information Service Center publishes the Unified Agenda in April and October of each year. The RIN contained in the heading of this document can be used to cross reference this action with the Unified Agenda.

## **List of Subjects in 23 CFR Part 650**

- Bridges
- Grant programs— transportation
- Highways and roads
- Incorporation by reference



- Reporting and record keeping requirements

Issued in Washington, DC, on July 16, 2013, under authority delegated in 49 CFR 1.85(a)(1).

Victor M. Mendez,

FHWA Administrator.

In consideration of the foregoing, the FHWA proposes to amend title 23, Code of Federal Regulations, part 650, by adding subpart E, as set forth below:

begin regulatory text

## **PART 650—BRIDGES, STRUCTURES, AND HYDRAULICS**

1.The authority citation for part 650 is amended to read as follows:

### **Authority:**

23 U.S.C. 119, 144, and 315.

2.Add Subpart E to read as follows:

- Sec.
- 650.501 Purpose.
- 650.503 Applicability.
- 650.505 Definitions.
- 650.507 Tunnel Inspection Organization.
- 650.509 Qualifications of personnel.
- 650.511 Inspection interval.
- 650.513 Inspection procedures.
- 650.515 Inventory.
- 650.517 Incorporation by reference.
- 650.519 Additional materials.

end regulatory text

## **Subpart E—National Tunnel Inspection Standards**

## § 650.501 Purpose.

This subpart sets the national standards for the proper safety inspection and evaluation of all highway tunnels in accordance with 23 U.S.C. 144.

## § 650.503 Applicability.

The National Tunnel Inspection Standards (NTIS) in this subpart apply to all structures defined as highway tunnels on all public roads, on and off Federal-aid highways, including tribally and federally owned tunnels.

## § 650.505 Definitions.

The following terms used in this subpart are defined as follows:

*American Association of State Highway and Transportation Officials (AASHTO) Manual for Bridge Evaluation.*

The term “AASHTO Manual for Bridge Evaluation” has the same meaning as in § 650.305.

*At-grade roadway.* Paved or unpaved travel ways within the tunnel that carry vehicular traffic and are not suspended or supported by a structural system.

*Bridge inspection experience.* The term “bridge inspection experience” has the same meaning as in § 650.305.

*Complex tunnel.* A tunnel characterized by advanced or unique structural elements or functional systems.

*Comprehensive tunnel inspection training.* FHWA-approved training that covers all aspects of tunnel inspection and enables inspectors to relate conditions observed in a tunnel to established criteria.

*Critical finding.* The term “critical finding” has the same meaning as in § 650.305.

*Damage inspection.* The term “damage inspection” has the same meaning as in § 650.305.

*Federal-aid highway.* The term “Federal-aid highway” has the same meaning as in 23 U.S.C. 101(a)(5).

*Functional systems.* Non-structural systems, such as electrical, mechanical, fire suppression, ventilation, lighting, communications, monitoring, drainage, traffic signals, emergency response (including egress, refuge room spacing, or carbon monoxide detection), or traffic safety components.

*Hands-on inspection.* The term “hands-on inspection” has the same meaning as in § 650.305.

*Highway.* The term “highway” has the same meaning as in 23 U.S.C. 101(a)(11).

*In-depth inspection.* A close-up inspection of one, several, or all tunnel structural elements or functional systems to identify any deficiencies not readily detectable using routine inspection procedures; hands-on inspection may be necessary at some locations. In-depth inspections may occur more or less frequently than routine inspections, as outlined in the tunnel-specific inspection procedures.

*Initial inspection.* The first inspection of a tunnel to provide all inventory and appraisal data and to determine the condition baseline of the structural elements and functional systems.

*Inspection Date.* The date established by the Program Manager on which a regularly scheduled routine inspection begins for a tunnel.

*Legal load.* The maximum legal load for each vehicle configuration permitted by law for the State in which the tunnel is located.

*Load rating.* The determination of the vehicular live load carrying capacity within or above the tunnel using structural plans and supplemented by information gathered from a routine, in-depth, or special inspection.

*Operating rating.* The term “operating rating” has the same meaning as in 23 CFR 650.305.

*Portal.* The entrance and exit of the tunnel exposed to the environment; portals may include bare rock, constructed tunnel entrance structures, or buildings.

*Procedures.* Written documentation of policies, methods, considerations, criteria, and other conditions that direct the actions of personnel so that a desired end result is achieved consistently.

*Professional engineer (P.E.).* An individual who has fulfilled education and experience requirements and passed rigorous examinations that, under State licensure laws, permits them to offer engineering services within their areas of expertise directly to the public. Engineering licensure laws vary from State to State. In general, to become a P.E., an individual must be a graduate of an engineering program accredited by the Accreditation Board for Engineering and Technology, pass the Fundamentals of Engineering exam, gain 4 years of experience working under a P.E., and pass the Principles of Practice of Engineering exam.

*Program manager.* The individual in charge of the inspection program who has been assigned or delegated the duties and responsibilities for tunnel inspection, reporting, and inventory. The Program Manager provides overall leadership and guidance to inspection Team Leaders.

*Public road.* The term “public road” has the same meaning as in 23 U.S.C. 101(a)(21).

*Quality assurance.* The use of sampling and other measures to assure the adequacy of quality control procedures in order to verify or measure the quality level of the entire tunnel inspection and load rating program.

*Quality control.* Procedures that are intended to maintain the quality of a tunnel inspection and load rating at or above a specified level.

*Routine inspection.* A regularly scheduled comprehensive inspection encompassing all tunnel structural elements and functional systems and consisting of observations and measurements needed to determine the physical and functional condition of the tunnel, to identify any changes from initial or previously recorded conditions, and to ensure that tunnel components continue to satisfy present service requirements.

*Routine permit load.* A vehicular load that has a gross weight, axle weight, or distance between axles not conforming with State laws for legally configured vehicles, and is authorized for unlimited trips over an extended period of time to move alongside other heavy vehicles on a regular basis.

*Special inspection.* An inspection, scheduled at the discretion of the tunnel owner, used to monitor a particular known or suspected deficiency.

*State transportation department (State DOT).* The term “State transportation department” has the same meaning as in 23 U.S.C. 101(a)(34).

*Team leader.* The on-site individual in charge of an inspection team responsible for planning, preparing, performing, and reporting on tunnel inspections.

*Tunnel.* An enclosed roadway for motor vehicle traffic with vehicle access limited to portals, regardless of type of structure or method of construction. Tunnels do not include bridges or culverts inspected under the National Bridge Inspection Standards (23 CFR part 650, subpart C—National Bridge Inspection Standards). Tunnels are structures that require, based on the owner's determination, special design considerations that may include lighting, ventilation, fire protection systems, and emergency egress capacity.

*Tunnel inspection experience.* Active participation in the performance of tunnel inspections in accordance with the National Tunnel Inspection Standards, in either a field inspection, supervisory, or management role. A combination of tunnel design, tunnel maintenance, tunnel construction, and tunnel inspection experience, with the predominant amount in tunnel inspection, is acceptable.

*Tunnel inspection refresher training.* A FHWA-approved training course that aims to improve the quality of tunnel inspections, introduce new techniques, and maintain the consistency of the tunnel inspection program.

*Tunnel Operations, Maintenance, Inspection and Evaluation (TOMIE) Manual.* The “Tunnel Operations, Maintenance, Inspection and Evaluation (TOMIE) Manual” 2013 edition, published by the Federal Highway Administration (incorporated by reference, *see* § 650.517).

*Tunnel-specific inspection procedures.* Written documentation of the directions necessary to plan for and conduct an inspection. Directions include, among other things, coverage of inspection methods, frequency of each method, inspection equipment, access equipment, identification of tunnel elements, components and functional systems, traffic coordination, and specialized qualifications for inspecting personnel.

## **§ 650.507 Tunnel Inspection Organization.**

- (a) Each State DOT must inspect, or cause to be inspected, all highway tunnels located on public roads, on and off Federal-aid highways, that are fully or partially located within the State's boundaries, except for tunnels that are owned by Federal agencies or tribal governments.
- (b) Each Federal agency must inspect, or cause to be inspected, all highway tunnels located on public roads, on and off Federal-aid highways, that are fully or partially located within the respective agency's responsibility or jurisdiction.
- (c) Each tribal government must inspect, or cause to be inspected, all highway tunnels located on public roads, on and off Federal-aid highways, that are fully or partially located within the respective tribal government's responsibility or jurisdiction.
- (d) Where a tunnel is jointly owned, all bordering States, Federal agencies, and tribal governments with ownership interests should determine through a joint formal written agreement the inspection responsibilities of each State, Federal agency, and tribal government.
- (e) Each State that contains one or more tunnels subject to these regulations, or Federal agency or tribal government with a tunnel under its jurisdiction, must include a tunnel inspection organization that is responsible for the following:
  - (1) Statewide, Federal agency-wide, or tribal government-wide tunnel inspection policies and procedures (both general and tunnel-specific), quality control and quality assurance procedures, and preparation and maintenance of a tunnel inventory.
  - (2) Tunnel inspections, written reports, load ratings, and other requirements of these standards.
  - (3) Maintaining a registry of nationally certified tunnel inspectors that work in their State or for their Federal agency or tribal government that includes, at a minimum, a method to positively identify each inspector, documentation that the inspector's training requirements are up-to-date, the inspector's current contact information and detailed information about any adverse action that may affect the good standing of the inspector.

(f) Functions identified in paragraphs (e)(1), (e)(2), and (e)(3) of this section may be delegated through a formal written agreement, but such delegation does not relieve the State DOT, Federal agency, or tribal government of any of its responsibilities under this subpart.

(g) The State DOT, Federal agency, or tribal government tunnel inspection organization must have a Program Manager with the qualifications listed in § 650.509(a), who has been delegated responsibility for paragraphs (e)(1), (e)(2) and (e)(3) of this section.

## **§ 650.509 Qualifications of personnel.**

(a) A Program Manager must, at a minimum, be a registered P.E. and have 10 years tunnel or bridge inspection experience and be a nationally certified tunnel inspector. In evaluating 10 years of experience, the following criteria should be considered:

(1) The relevance of the individual's actual experience, including the extent to which the individual's experience has enabled the individual to develop the skills needed to properly lead a tunnel safety inspection.

(2) The individual's exposure to the problems or deficiencies common in the types of tunnels being inspected by the individual.

(3) The individual's understanding of the specific data collection needs and requirements.

(b) A Team Leader must, at a minimum, be a registered P.E. and be a nationally certified tunnel inspector.

(c) The individual responsible for load rating a tunnel must be a registered P.E.

(d) An inspector must, at a minimum, be a nationally certified tunnel inspector.

(e) A nationally certified tunnel inspector must:

(1) Complete a FHWA-approved comprehensive tunnel inspection training course,

(2) Complete a FHWA-approved tunnel inspection refresher training course once every 48 months subsequent to satisfying the requirement of paragraph (e)(1) of this section,

(3) Provide documentation of their training status and current contact information to the Tunnel Inspection Organization of each State DOT, Federal agency, or tribal government for which they will be performing tunnel inspections.

## **§ 650.511 Inspection interval.**

Each State DOT, Federal agency, or tribal government tunnel inspection organization must conduct or cause the following to be conducted for each tunnel described in § 650.503:

(a) *Initial Inspection.* (1) For existing tunnels, within 24 months of the effective date of this rule, conduct a routine inspection of each tunnel according to the inspection guidance provided in the Tunnel Operations, Maintenance, Inspection and Evaluation (TOMIE) Manual (incorporated by reference, *see* § 650.517).

(2) For tunnels completed after these regulations take effect, the initial routine inspection shall be conducted after all construction is completed and prior to opening to traffic according to the inspection guidance provided in the Tunnel Operations, Maintenance, Inspection and Evaluation (TOMIE) Manual (incorporated by reference, *see* § 650.517).

(b) *Routine Inspections.* (1) Establish for each tunnel the NTIS routine inspection date in a month and year (MM/YY) format. This date should only be modified by the Program Manager in rare circumstances.

(2) Inspect each tunnel at regular 24-month intervals.

(3) For tunnels needing inspection more frequently than at 24-month intervals, establish criteria to determine the level and frequency to which these tunnels are inspected based on a risk analysis approach that considers such factors as tunnel age, traffic characteristics, geotechnical conditions, and known deficiencies.

(4) Certain tunnels may be inspected at regular intervals up to 48 months. This may be appropriate when past inspection findings and analysis justifies the increased inspection interval. At a minimum, the following criteria shall be used to determine the level and frequency of inspection based on an assessed lower risk: Tunnel age, time from last major rehabilitation, tunnel complexity, traffic characteristics, geotechnical conditions, functional systems, and known deficiencies. A written request that justifies a regular routine inspection interval between 24 and 48 months shall be submitted to FHWA for review and comment prior to the extended interval being implemented.

(5) Inspect each tunnel in accordance with the established interval. The acceptable tolerance for inspection interval is within 2 months before or after the inspection date established in § 650.511(b) (1) in order to maintain that date. The actual month and year of the inspection are to be reported in the tunnel inventory.

(c) *Damage, in-depth, and special inspections.* The Program Manager shall establish criteria to determine the level and frequency of damage, in-depth, and special inspections. Damage, in-depth, and special inspections may use non-destructive testing or other methods not used during routine inspections at an interval established by the Program Manager. In-depth inspections should be scheduled for complex tunnels and for certain structural elements and functional systems when necessary to fully ascertain the condition of the element or system.

## § 650.513 Inspection procedures.

Each State DOT, Federal agency, or tribal government tunnel inspection organization, to carry out its inspection responsibilities, must perform or cause to be performed the following:

- (a) Inspect tunnel structural elements and functional systems in accordance with the inspection guidance provided in the Tunnel Operations, Maintenance, Inspection and Evaluation (TOMIE) Manual (incorporated by reference, *see* § 650.517).
- (b) Provide at least one Team Leader, who meets the minimum qualifications stated in § 650.509, at the tunnel at all times during each initial, routine, and in-depth inspection. The State DOT, Federal agency or tribal government national certified tunnel inspector identification for each Team Leader that is wholly or partly responsible for a tunnel inspection must be reported to the tunnel inventory.
- (c) Prepare and document tunnel-specific inspection procedures for each tunnel inspected and inventoried, taking into account the design assumptions, commensurate with tunnel complexity, identifying tunnel structural elements and functional systems to be inspected, methods of inspection, frequency of inspection for each method, and inspection equipment, access equipment and traffic coordination needed.
- (d) Establish requirements for functional system testing, direct observation of critical system checks, and testing documentation.
- (e) For complex tunnels, identify specialized inspection procedures, and additional inspector training and experience required to inspect complex tunnels. Inspect complex tunnels according to the specialized inspection procedures.
- (f) Conduct tunnel inspections with qualified staff not associated with the operation or maintenance of the tunnel structure or functional systems.
- (g) Rate each tunnel as to its safe vehicular load-carrying capacity in accordance with the AASHTO Manual for Bridge Evaluation (2011 edition). A load rating evaluation shall be conducted as soon as practical but not later than 1 month after the completion of the inspection. Post or restrict the highways in or over the tunnel in accordance with this same manual, or in accordance with State law when the maximum unrestricted legal loads or State routine permit loads exceed that allowed under the operating rating or equivalent rating factor. Postings shall be made as soon as possible but not later than 48 hours after a valid load rating determines their need. At-grade roadways in tunnels are exempt from load rating. Load rating calculations or input files with a summary of results are to be maintained as a part of the tunnel record.
- (h) Prepare tunnel inspection documentation as described in the Tunnel Operations, Maintenance, Inspection and Evaluation (TOMIE) Manual (incorporated by reference, *see* § 650.517), and maintain



written reports on the results of tunnel inspections together with notations of any action taken to address the findings of such inspections. Maintain relevant maintenance and inspection data to allow assessment of current tunnel condition. At a minimum, information collected must include data regarding basic tunnel information (e.g., tunnel location, posted speed, inspection reports, repair recommendations, and repair and rehabilitation work completed), tunnel and roadway geometrics, interior tunnel structural features, portal structure features, and tunnel systems information. Tunnel data collected must also include diagrams, photos, condition of each structural and functional system component, and notations of any action taken to address the findings of such inspections as well as the national tunnel inspector certification registry identification for each Team Leader responsible in whole or in part for the inspection.

- (i) Ensure that systematic quality control and quality assurance procedures are used to maintain a high degree of accuracy and consistency in the inspection program. Include periodic field review of inspection teams, data quality checks, and independent review of inspection reports and computations.
- (j) Establish a Statewide, Federal agency-wide, or tribal government-wide procedure to ensure that critical findings are addressed in a timely manner. Notify FHWA within 24 hours of any critical finding and the activities taken, underway, or planned to resolve or monitor the critical finding. Update FHWA regularly or as requested on the status of each critical finding until it is resolved. Annually provide a written report to FHWA with a summary of the current status of the resolutions for each critical finding identified within that year or unresolved from a previous year.
- (k) Provide information annually or as required in cooperation with any FHWA review of State DOT, Federal agency, or tribal government compliance with the NTIS. FHWA will annually assess State DOT compliance using statistically based assessments and well-defined measures based on the requirements of this subpart.

## **§ 650.515 Inventory.**

- (a) *Preliminary inventory.* Each State, Federal agency, or tribal government must collect and submit the inventory data and information described in FHWA-approved recording and coding guidance for all tunnels subject to the NTIS within 120 days of the effective date of this subpart.
- (b) *National Tunnel Inventory.* Each State, Federal agency, or tribal government must prepare, maintain, and make available to FHWA upon request, an inventory of all highway tunnels subject to the NTIS that includes the preliminary inventory information submitted in paragraph (a) of this section, that reflects the findings of the most recent tunnel inspection conducted, and is consistent and coordinated with the requirements of any FHWA-approved recording and coding guidance.

(c) *Data entry for inspections.* For all inspections, enter the appropriate tunnel inspection data into the State DOT, Federal agency, or tribal government inventory within 3 months from the completion of the inspection.

(d) *Data entry for tunnel modifications and new tunnels.* For modifications to existing tunnels that alter previously recorded data and for new tunnels, enter the appropriate data into the State DOT, Federal agency, or tribal government inventory within 3 months after the completion of the work.

(e) *Data entry for tunnel load restriction and closure changes.* For changes in traffic load restriction or closure status, enter the data into the State DOT, Federal agency, or tribal government inventory within 3 months after the change in status of the tunnel.

## **§ 650.517 Incorporation by reference.**

(a) Certain material is incorporated by reference into this part with the approval of the Director of the Federal Register under **5 U.S.C. 552(a)** and **1 CFR part 51**. To enforce any edition other than that specified in this section, the FHWA must publish notice of change in the Federal Register and the material must be available to the public. All approved material is available for inspection at 1200 New Jersey Avenue SE., Washington, DC 20590. For questions regarding the availability of this material at the FHWA, call Ms. Jennifer Outhouse, Office of the Chief Counsel, HCC-10, (202) 366-0761. This material is also available for inspection at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call (202) 741-6030 or go to [http://www.archives.gov/federal\\_register/code\\_of\\_federal\\_regulations/ibr\\_locations.html](http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html).

(b) A hard copy of the following incorporated material is available for inspection at the Office of Asset Management, Federal Highway Administration, U.S. Department of Transportation, 1200 New Jersey Avenue SE., Washington, DC 20590.

(1) “Tunnel Operations, Maintenance, Inspection and Evaluation (TOMIE) Manual,” 2013 edition, U.S. Department of Transportation, FHWA-IF-13-XXX, available in electronic format at <http://www.fhwa.dot.gov/bridge/tunnel/management/>. In the event there is a conflict between the standards in this subpart and any of these materials, the standards in this subpart will apply.

(2) [Reserved]

(c) [Reserved]

## **§ 650.519 Additional materials.**

The FHWA recommends the States consult the following materials when establishing their tunnel inspection programs.

- (a) The FHWA Technical Manual for Design and Construction of Road Tunnels—Civil Elements, December 2009, Publication No. FHWA-NHI-10-034. This manual is available from FHWA at the following URL: <http://www.fhwa.dot.gov/bridge/tunnel/pubs/nhi09010/index.cfm>.
- (b) The AASHTO Technical Manual for Design and Construction of Road Tunnels—Civil Elements, First Edition. The manual is available for purchase from the American Association of State Highway and Transportation Officials, Suite 249, 444 North Capitol Street NW., Washington, DC 20001, (202) 624-5800. The manual may also be ordered via the AASHTO bookstore located at the following URL: <http://www.transportation.org>.
- (c) The NFPA 502: *Standard for Road Tunnels, Bridges, and Other Limited Access Highways* (2011 edition). The manual is available for purchase from the National Fire Protection Association, 1 Batterymarch Park, PO Box 9101, Quincy, MA 02269-9101, call toll-free: 1-800-344-3555. The manual may also be ordered via NFPA online catalog located at the following URL: <http://catalog.nfpa.org>.

[FR Doc. [2013-17875](#) Filed 7-29-13; 8:45 am]

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## Footnotes

1. See section III.D. for more information.

### Back to Context

2. “Ceiling Collapse in the Interstate 90 Connector Tunnel Boston, Massachusetts July 10, 2006,” Highway Accident Report, NTSB/HAR-07/02, July 10, 2006. An electronic format version is available at: <http://www.nts.gov/doclib/reports/2007/HAR0702.pdf>.

### Back to Context

3. The U.S. Department of Transportation, Office of the Inspector General, “Challenges Facing the U.S. Department of Transportation, Fiscal Year 2008,” October 2007, CC-2008-007. An electronic format version is available at:  
[http://www.oig.dot.gov/sites/dot/files/pdfdocs/Statement6\\_DOTActivities101507\\_508version.pdf](http://www.oig.dot.gov/sites/dot/files/pdfdocs/Statement6_DOTActivities101507_508version.pdf).

### Back to Context

4. <http://abcnews.go.com/blogs/headlines/2012/12/japan-orders-immediate-inspections-after-deadly-tunnel-collapse/>.

### Back to Context

5. <http://www.amtrak.com/ccurl/920/456/Amtrak-Requests-.pdf>.

**Back to Context**

6. <http://www.independent.co.uk/news/world/europe/new-tunnel-rules-to-be-introduced-after-high-death-toll-7566220.html>.

**Back to Context**

7. See <http://www.coloradodot.info/travel/eisenhower-tunnel/eisenhower-tunnel-interesting-facts.html>.

**Back to Context**

8. Federal Highway Administration, “Underground Transportation Systems in Europe: Safety, Operations, and Emergency Response,” Office of International Programs, FHWA-PL-06-016, June 2006. An electronic format version is available at: <http://international.fhwa.dot.gov/uts/uts.pdf>.

**Back to Context**

9. National Cooperative Highway Research Program, “Best Practices for Implementing Quality Control and Quality Assurance for Tunnel Inspection,” Prepared for the AASHTO Technical Committee for Tunnels (T-20), NCHRP Project 20-07, Task 261 Final Report, October 2009. An electronic format version is available at: [http://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP20-07\(261\)\\_FR.pdf](http://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP20-07(261)_FR.pdf).

**Back to Context**

10. National Cooperative Highway Research Program, “Best Practices for Roadway Tunnel Design, Construction, Maintenance, Inspection, and Operations,” Prepared for the AASHTO Technical Committee for Tunnels (T-20), NCHRP Project 20-68A Scan 09-05 Final Report, April 2011. An electronic format version is available at: [http://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP20-68A\\_09-05.pdf](http://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP20-68A_09-05.pdf).

**Back to Context**

11. The definition of a highway tunnel used in the 2003 survey pertained to a single “bore” or constructed shape, but did not pertain to a given tunnel name (i.e. a tunnel such as the Holland tunnel in New York actually consists of two tunnels, one in each direction).

**Back to Context**

12. The Federal Highway Administration/Federal Transit Administration “Highway and Rail Transit Tunnel Inspection Manual,” 2005 edition, is available in electronic format at: <http://www.fhwa.dot.gov/bridge/tunnel/management/>.

**Back to Context**

13. In July 2012, VDOT entered into a 58-year concession with Elizabeth River Crossings for the Downtown and Midtown tunnels in southern Virginia. The concession agreement requires Elizabeth River Crossings to meet or exceed VDOT's standards for tunnel inspections, including tunnel inspections frequencies.

**Back to Context**

14. "Pavement preservation: protecting your airport's biggest investment," AirTAP Briefings, Airport Technical Assistance Program of the Center for Transportation Studies at the University of Minnesota, summer 2005. An electronic version is located at:

<http://www.airtap.umn.edu/publications/briefings/2005/Briefings-2005-Summer.pdf>.

**Back to Context**